Fall 2011

Designing Our Tribe with Online Learning in an Elementary Classroom

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DESIGNING OUR TRIBE WITH ONLINE LEARNING IN AN ELEMENTARY CLASSROOM

by

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A Dissertation

Presented in Partial Fulfillment of Requirements for the

Degree of

Doctor of Education

In

Leadership for Learning

In the

Bagwell College of Education

Kennesaw State University

Kennesaw, GA

2011

Kennesaw State University
Bagwell College of Education

Dissertation Signature Page

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Instructional Technology
CONCENTRATION

Titled:
Designing Our Tribe with Online Learning in an Elementary Classroom

submitted to the Bagwell College of Education in partial fulfillment of the requirements for the degree of:

Doctor of Education

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DEDICATION

I dedicate this dissertation to my amazing wife, Enid and my son, Timo, for all of their support, love, humor, and patience throughout my studies as a graduate student.

ACKNOWLEDGEMENTS

Pursuing my educational goals has been a lifelong endeavor, yet I have received tremendous support along this path. I would like to thank my dissertation chair, Dr. Jo Williamson, for providing guidance and encouragement. She has greatly influenced my vision as a technology leader with her high standards and expectations, yet she is simultaneously nurturing and caring. All of these are excellent qualities of a teacher. I would also like to thank my dissertation committee members, Dr. Corrie Davis, Dr. Leigh Funk, and Dr. Julie Moore. As my qualitative methodologist, Dr. Davis provided me with the instruction and eventual capability to collect and analyze mounds of data into a logical and compelling story. Dr. Funk first introduced me to best practices in online learning and design-based research, which continue to inspire and motivate me. Dr. Moore first joined my committee as an observer but ended up providing me with invaluable insight into communities of practice. In addition, I would like to express my appreciation to Dr. Nita Paris and Dr. Harriet Bessette for striving to achieve and maintain their vision for this doctor of education degree at Kennesaw State University. I have learned so much from my professors over the past four years, and I thank all of them for their hard work and dedication. I would also like to thank the members of my KSU doctoral cohort for being a supportive team, and I would especially like to thank the members of my technology cohort who laughed and worked alongside me – Travis Schmid, the constant cheerleader, and Judy Winzurk. I will always remember Judy's dedication to her family, education, and instructional technology. I need to express my appreciation to my mother, Winnie Clark, for believing in me, and I appreciate my son, Timo, for encouraging me with his passion for music and for listening to my stories. Finally, I thank my wife, Dr. Enid Colón for supporting me throughout this journey and being so understanding along the way. She read through my dissertation several times and offered suggestions for improvement, and her love and attention made all the difference.

ABSTRACT

The purpose of this study was to investigate how the design of an online learning environment within a learning management system (LMS) could enhance learning experiences for fourth grade students and their teacher in a traditional face-to-face classroom over a five-week period. Online learning activities were developed in coordination with the researcher, the teacher, and the students utilizing a design-based research methodology in order to promote student interaction and collaboration within an online learning environment. Given the dearth of research in online or blended learning in elementary grades, this study was a qualitative exploratory investigation based on the principals of design-based research. The rationale of this study was to attempt to understand on a fundamental level how strategically designed online learning activities within an LMS could facilitate student interaction and collaboration, and the study was guided by three major research questions:

1. What features and characteristics of an online learning environment within an LMS encourage collaboration in a fourth grade classroom?
2. How does interaction among students with each other, their teacher, and the content occur and develop within an online learning environment?
3. How does participating in an online learning environment enhance learning for the fourth grade students involved in this study?

Data collection was on-going throughout this study and included observations of activities in the face-to-face classroom, as well as online open-ended surveys of students, focus group interviews with students, e-mail correspondence, discussions and planning sessions with the classroom teacher, and a review of online documents and artifacts. The researcher considered this data while designing modifications to the online learning environment throughout the course of the

study. Trustworthiness and transferability were supported by triangulation of sources of data, multiple session interviews, member checking, and thorough descriptions. Multiple themes emerged from the data of this exploratory study and were embedded within apparently conflicting issues. The following concerns were related to the features and characteristics of an online learning environment within an LMS that encouraged collaboration: (1) *the blending of online and face-to-face learning activities*; (2) *individual responsibility and collaborative work*; and (3) *asynchronous and synchronous participation*. Interaction occurred and developed through the following strategies: (1) *teacher-directed activities and student choices*; (2) *academic standards and personal interests*; (3) *the shifting roles of the teacher and students*; and (4) *informal and formal topics of discussion*. Finally, benefits of online learning were noted for the participants involved in this study related to *interpersonal and intrapersonal changes* they experienced through their online collaboration and interaction. The findings from the data were disseminated to discuss specific recommendations for practicing educators for the design of online learning environments for elementary students. These recommendations are as follows: (1) teach netiquette at the onset of the implementation; (2) incorporate time for social discourse and conversation; (3) encourage opportunities for student collaboration; (4) provide the students with choices; (5) encourage asynchronous participation; (6) have teachers model the learning; (7) practice the technical skills; (8) utilize student experts; (9) develop understanding through discussion forums; and (10) explore personal interests.

Keywords: technology integration; blended learning; online learning; learning management systems; design-based research; student engagement; communities of practice; collaboration; communication; interaction

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CHAPTER I

INTRODUCTION

This study explored the design and implementation of an online learning environment within a learning management system (LMS) in a traditional, face-to-face fourth grade classroom to facilitate and promote student interaction and collaboration utilizing a design-based research methodology. The afore-mentioned characteristics are essential elements of a community of practice (Brown, Collins, & Duguid, 1989; Lave and Wenger, 1991; Wenger, McDermott, & Snyder, 2002). Design-based research attempts to understand educational theory within the context of the learning environment (Collins, A., Joseph, D., & Bielaczyc, K., 2004), and throughout this investigation, the researcher was integrally involved in the design and implementation of the online learning environment that was utilized by the participants in the study during a five-week instructional unit within the LMS.

An instructional unit on Native American tribes was collaboratively developed within the LMS. Because of the design-based research methodology that I employed throughout this investigation, the collaborators involved in the design and development of the online learning environment included the teacher and student participants as well as the researcher. The online learning environment evolved to accommodate the independent and group work of the students and became known as the *Online Learning Community (OLC)* during one phase of the design. The OLC was the primary method of delivering instruction during this study, but it also supported the activities that the students completed in their face-to-face classroom. As a

cumulative class project toward the end of the unit of study, the students developed a class tribe based on the concepts that they had learned in their study of Native American tribes.

In this introductory chapter, I describe how technology innovations have continued to impact education and led to the growth of online learning opportunities. Furthermore, I explain how online interaction can encourage individuals to form communities of practice with common goals and vocabulary in order to solve shared problems. Finally, I provide details about this study that may assist the reader in developing an understanding of how the participants designed their tribe through online learning.

Transforming Education with Technology Innovations

According to Prensky (2008), advances in technology have changed society by empowering students with a wealth of global information, and now the role of the teacher in the classroom has also changed. In the past, when children first entered the classroom, teachers taught them how to read and through reading, made the world more accessible. Teachers showed students how to solve problems, describe their ideas, and memorize history; they exposed them to places around the globe through lectures, discussions, and books. However, not every child found school interesting, and many withdrew or simply dropped out without serious repercussions.

In contrast, today's students accumulate a vast amount of information before they even enter a classroom; they are immersed in electronic devices that enable them to learn about their interests from millions of references (Prensky, 2008). Unfortunately for many students, when they enter traditional classrooms without the use of technology, their broad vision of the world is left behind. Technology can be used to assist in the instructional process as students utilize those

tools to construct meaning of the information they encounter in their learning environment (Keengwe, Onchwari, & Wachira, 2008). Teachers then become providers of meaning and explanations instead of providers of information since students can establish their own understandings.

In a letter to the U.S. Congress as an introduction to the 2004 National Education Technology Plan, then Secretary of Education, Rod Paige, noted that as new technology was introduced to schools, educators simply applied that new technology to existing ways of teaching and learning without utilizing the innovative instructional advantages presented by that technology (U.S Department of Education, 2004). Now, as students have often become so much more comfortable with new technology, including the Internet, than their teachers, they are influencing the technological changes that are happening within their schools. According to the 2004 National Education Technology Plan, students usually prefer locating information on the Internet because they are discovering that it is usually more accessible and up-to-date than the information that they can typically find in their textbooks (U.S. Department of Education, 2004). In addition, students comment that they use technology more in their homes than in their schools, and they feel more prepared to use technology than their teachers.

The use of technology in schools can be used to transform educational experiences from traditional teacher-directed instruction into more student-centered learning activities (Beldarrain, 2006; Matzen & Edmunds, 2007; Angeli, 2008). Furthermore, due to global competition for jobs and resources, it is essential that our students develop more proficiency with technology by working collaboratively to develop critical-thinking skills while engaged in real-world problem-solving and discourse (Stewart, 2007; Bai, 2009; Asunda, 2010; Lucey & Grant, 2010).

Facilitating Instruction through Online Learning

Technology offers opportunities for learning and working via the Internet with methods involving social networking (Woo & Reeves, 2007; Barlow, 2008; Bull & Hammond, 2008). The use of technology has become increasingly more collaborative as students have discovered that they are capable of editing, producing, and publishing original content via these online networks (McLester, 2007; Ma & Yuen, 2008; Lucey, O'Malley, & Jansem, 2009). Motivating students to become more engaged in their learning can be accomplished by connecting them with their peers to develop solutions to real problems (Koh, Herring, & Hew, 2010).

There continues to be a growing quantity of research in online learning (Tallent-Runnels et al., 2006), and this research has shown online learning to be beneficial for a variety of instructional purposes, including: foreign language instruction (Lee, 2005); critical thinking (Lucey & Grant, 2010); motivation (Wang & Reeves, 2006); collaboration (Su & Beaumont, 2010); communication (Sawmiller, 2010); writing (Ma & Yuen, 2008); reading instruction (Larson, 2009); and student engagement (Minjuan, 2007). Although there is an increasing wealth of information about online learning in higher education and to a somewhat lesser extent in secondary education, a recent meta-analysis of research studies in online learning by the U.S. Department of Education found relatively few studies on online learning in elementary classrooms (U.S. Department of Education, 2009).

Shared Learning Experiences in Online Communities of Practice

Collaborating within a community of practice can both initiate and facilitate the process of learning (Brown et al., 1989; Lave & Wenger, 1991). As students interact within the context of their learning environment, they co-construct knowledge through discourse and experience

(Brown, 1992; Lave & Wenger, 1991; Wenger et al., 2002). The students in a learning community begin to develop a shared vocabulary that helps them to communicate more effectively about what they are learning, and they collectively develop schemata that help them make sense of their observations and activities (Brown, 1997). Brown (1997) noted that this pursuit does not have to take place face-to-face; rather, extending the walls of the classroom into online virtual space can enrich understanding by exposing the students to models of reasoning and in-depth reflection about the learning process. By using a learning management system, teachers may help students learn and practice the skills that are necessary for successful learning activities utilizing technology (Daniels, 2009).

Supporting Online Instruction with Learning Management Systems

A learning management system (LMS), also referred to as a course management system (CMS), is an Internet-based tool that provides educators with the technological means to develop, contain, and present online instructional materials for students. Some well-known learning management systems include the following: Blackboard, WebCT, Moodle, and Angel Learning System (Ioannou & Hannafin, 2008). This study utilized Angel Learning System that was acquired by Blackboard Inc. in May 2009. An LMS can be used to support a class held solely online; however, learning management systems are often implemented to supplement face-to-face instruction and typical classroom activities in an approach described as blended learning. Although learning management systems have been used extensively throughout higher education, they may also be useful in teaching elementary students (Simonson, 2007).

Philosophical Viewpoint of Collaborative Online Learning

Instructional designers believe that quality interaction can be implemented and improved by the use of technology, including the Internet (Woo & Reeves, 2007; Ke & Hoadley, 2009). Carefully designed activities for online learning can create an environment for constructive social interaction (Hull & Saxon, 2009). These activities must promote dialogue so that there are opportunities for peers to influence each other and establish their own informal strategies for communication. Utilizing online communication tools can also help to provide students with opportunities to reflect about what they have learned (Lucey et al., 2009). Through discussion forums, a learning community can be developed and fostered by the participants.

Using technology in student-centered ways can motivate students to learn through interaction among peers on authentic tasks (Woo & Reeves, 2007). Some examples of student-centered practices include students working together to gather and process information, to solve problems, and to present knowledge in creative ways. These experiences can encourage students to socially construct meaning as they negotiate with each other to arrive at common understandings. This collaboration may also contribute to higher order cognitive skills as the members of the learning community work to resolve conflicts or restructure their ways of thinking (Guiller, Durndell, & Ross, 2008).

Problem Statement

Although there has been a tremendous increase in the amount of computers available in schools, actual computer usage in classrooms remains low (Zhao, Pugh, Sheldon, & Byers, 2002). There has been relatively little research on how and why American teachers use technology, and although student-centered practices can lead to improved student performance,

teachers primarily use technology for tasks that are unrelated to instruction (Kopcha, 2010). Technology is best utilized, according to Angeli (2008), when a qualitative transformation occurs with how teachers teach and students learn. Garrison & Cleveland-Innes (2005) asserted that students in an online learning community, in particular, should be engaged in meaningful interaction and reflection while critically exploring ideas in a process of inquiry.

Simonson (2007) noted that there are many possible benefits of learning management systems and explained that they continue to become more critical for instruction. An LMS enables teachers to utilize the collaborative aspects of the Internet like blogging, creating wikis, and podcasting, but in a safer online environment; furthermore, an LMS can also provide methods of organization and communication that may be beneficial for learners (Daniels, 2009). Although, the research on online learning for elementary students is limited, online learning opportunities continue to grow in elementary schools, and there is a need for additional research in this area (DiPietro, Ferdig, Black, & Preston, 2008).

Statement of Purpose and Research Questions

The purpose of this study was to explore the capability of strategically designed online learning activities within an LMS in order to facilitate student interaction and collaboration. Over a five-week period, the teacher and students of a fourth grade classroom utilized the LMS as the primary approach for delivering of instruction. From a social constructivist perspective, when students interact in a virtual community of practice, they can engage in discourse that can lead to new understandings (Dubé, Bourhis, & Jacob, 2006; Woo & Reeves, 2007; Hull & Saxon, 2009). As the researcher, I worked with the classroom teacher and the students to design the online learning environment within the LMS to promote a communal context in which the

participants could communicate, share information, and collectively build new understandings. While collaborating within the LMS, the students employed the communication tools of discussion forums, email, wikis, and blogs while working on authentic project-based learning activities. This study investigated these issues by attempting to answer the following questions:

1. What features and characteristics of an online learning environment within an LMS encourage collaboration in a fourth grade classroom?
2. How does interaction among students with each other, their teacher, and the content occur and develop within an online learning environment?
3. How does participating in an online learning environment enhance learning for the fourth grade students involved in this study?

Research Design Overview

This exploratory study employed the methodology of design-based research delineated by Ann Brown (1992). Brown (1992) proposed that research had to occur within the context of the learning environment; therefore, I incorporated the methodology of qualitative research by interact with the participants in the context of their classroom and then by collecting and analyzing the data that resulted from their online activities (Merriam, 2009). The use of qualitative methods enabled me to comprehend and convey the stories of the participants as they interacted within the online learning environment. Design-based research assumes that the process of learning involves the learner, the learning environment, and the activity; therefore, these elements must be studied together (Barab & Squire, 2004). Furthermore, the researcher has to become an integral aspect of the research process in order to make continual, cyclical modifications to the design of the innovation in order to observe possible changes. In order to promote the development of an online learning community among the participants, it was also

essential for me, as the researcher, to collaborate with the fourth grade classroom teacher and her students as we designed the online learning environment within the LMS.

Specific elements within the design of the online learning environment included learning tasks and discussions organized around authentic tasks and projects. To become a community of practice, according to Wenger et al. (2002), learners have to be engaged in the community (the collective group or subgroups of learners); the domain (the topics or information to be learned); and the practice (the activities for collaboration). In project-based learning, students are involved in the practice of constructing knowledge by working on real-world tasks that engage them in the process of asking questions, searching for information, brainstorming, designing, and testing alternative solutions (Koh et al., 2010). Interaction within the members of the group can occur online through discussion forums and email, and the teacher can utilize these same features to provide coaching and feedback (Woo & Reeves, 2007). In this manner, students can learn from discourse with each other, including expert peers, within the online learning environment of an LMS.

As the teacher and students worked within the LMS, I collected qualitative data including student discussion posts, emails, and weekly open-ended surveys. I also conducted observations in the face-to-face classroom and within the LMS as students interacted with their peers, their teacher, and with me. I noted how the teacher provided feedback to the students as well as the types of feedback she gave to them. As the study progressed, the participants and I made modifications to the online learning environment as needed, to promote more meaningful interaction, communication, and inquiry, in order to achieve more critical thinking and reflection (Woo & Reeves, 2007). In addition, I collected the completed student projects as artifacts of student knowledge construction as a result of our collaboration. I conducted weekly focus group

interviews with students to determine their level of interaction within this virtual community of practice. One indicator of a community of practice is that the students are continually moving from legitimate peripheral participation in the group to the center of the group's learning, activities, and practice (Lave & Wenger, 1991). Furthermore, I participated in a preliminary planning session and regular informal discussions with the teacher to analyze the progress of the students and to determine if we should design additional modifications to the online learning environment.

Limitations and Delimitations

One limitation of this study was that since it was specific to the needs of this particular context, any conclusions I made during the exploration may not be transferable to other contexts; however, in design-based research, the goal is to learn more about a theory that characterizes the design in practice (Barab & Squire, 2004). Another limitation was that it was essential for me to be inextricably involved in the design, implementation, and study of the students' use of the online learning environment; therefore, some of my bias for the integration of technology may also be present. I attempted to use additional care in removing my bias from the analysis of the data collected during the study. Furthermore, the enthusiasm of the teacher and me for the use of technology and project-based activities may have indirectly influenced the students to be more participatory in the online assignments.

A delimitation for this study was that it focused particularly on elementary students within a virtual community of practice, but this was intentional since there is scant research on online learning in the elementary grades. The time frame allotted for this study may have led to another delimitation because it could take an extensive amount of time to develop the level of interaction that is characteristic of a community of practice (Wenger et al., 2002), and this study

occurred over a period of only five weeks. However, this time span provided a snapshot of the development of a virtual community of practice. A final delimitation was that the students were already working within a face-to-face class for the preceding months of the school year, and no additional students were added into the online learning environment.

This research was not intended to provide information that directly related to quantitative scores on standardized tests about the instructional units studied within the classroom; however, all of the content was directly related to the appropriate standards for these students. This study was also not intended to provide information about online learning or communities of practice within all learning environments or at all grade levels. The focus of this study was particularly within the fourth grade classroom of an elementary school where technology hardware and Internet access were already in place. Because of the careful guidance and monitoring that the teacher and I utilized within this study, it may not be predictive of these students' possible performance in future online learning environments.

Assumptions

I made some assumptions for the study based on the review of the literature and on my professional experiences as an instructional technology specialist. The first assumption was that most fourth grade students are engaged when working with technology; although they may be using technology for personal entertainment rather than for learning (Lee & Spires, 2009). Next, elementary students usually enjoy working in collaborative groups while attempting to solve real-world problems or to complete projects. Finally, students are sometimes more skilled than their teachers at utilizing technology for learning or for entertainment, and they tend to be willing to share their expertise with others.

Rationale and Significance

The rationale for this study was my desire to encourage teachers and students to utilize technology in meaningful ways that foster interaction and collaboration. As I positioned earlier in this introduction, students demonstrate their engagement in the learning processes involved in a community of practice as they progress, as needed, from the periphery of the group to the center of activity within the community (Lave & Wenger, 1991). Interacting within a community of practice can lead to socially constructed knowledge and new ideas that may be the premise of many popular Web 2.0 applications such as Facebook, Twitter, and YouTube (Junco, Heibergert, & Loken, 2011). Students have experimented with these sites and applications and have made mistakes with severe consequences. However, by utilizing these Internet applications within the security of an online classroom inside of a learning management system, students may learn appropriate rules of safety and etiquette that could serve them well later in life.

Definitions of Key Terminology

Design-Based Research

In design-based research, the researcher is integral to the design and modifications of the innovation or tool being studied within a particular context (Brown, 1992). The researcher becomes known to the participants in the study by collaborating with them to determine the possible modifications that may need to be made to the innovation. Furthermore, the goal of design-based research is to guide understand about the learning theory being utilized by the practices occurring in the learning environment (Barab & Squire, 2004).

Qualitative Research

Qualitative researchers attempt to understand in depth how individuals interact and create meanings from their experiences (Merriam, 2009). In this research, the investigator interacts with the participants within the natural setting or environment to develop a deep understanding of their behaviors and learn their personal stories. Data in qualitative research are usually accumulated by recording observations, maintaining field notes, completing interviews, and collecting documents and artifacts. When the data are analyzed by the researcher, recurring themes or categories generally emerge that illuminate explanations and theories for the phenomenon being studied.

Community of Practice

Lave and Wenger (1991) described a community of practice (CoP) as a group of people who share an interest in a particular topic or domain. Communities of practice often happen informally as people with shared interests begin to find each other and create the norms and practices of their community through casual conversations and collective experiences. Often the shared interest in the topic is enough to bind the community together, and it can lead to the development of shared understandings. Eventually, an individual's personal identity can be closely linked to the goals and successes of the community.

Legitimate Peripheral Participation

Legitimate peripheral participation was used by Lave and Wenger (1991) to discuss how individuals assume different roles within the community as necessary. Students can observe the activities and discussions of their peers within the online community, and they can become familiar with the vocabulary as well as knowledgeable of the processes their peers are utilizing.

This participation is a legitimate practice of work within the community, and when students are ready, they may move from the outside of a community of practice into the central activities of the group. This usually occurs through involvement in the practices of the community and through informal conversations with peer experts within the group. As individuals, become more knowledgeable about the activities of the community, they become more crucial to the ultimate success of that group. Students can move back and forth between the periphery and the core of the community of practice as they continually learn new skills and strategies for working and learning together.

Virtual Community of Practice

According to Ardichvili (2008), a virtual community of practice (VCoP), also known as an online community of practice, is created online through discussions or other forms of online communication. In this environment, they share knowledge and learn collectively (Dubé et al., 2006). One important note about a VCoP is that the members of the community may never actually meet each other face-to-face. The rules, structure, and procedures for a VCoP occur online and often develop informally.

Learning Management System

A learning management system (LMS) is a technology tool that provides opportunities to present students with online methods of organization, instructional activities, assessments, and communication tools (Simonson, 2007). An LMS may be either open-source (free) or paid by subscription. Teachers can utilize Web 2.0 collaborative activities such as discussion forums, blogs, and wikis within an LMS, but many teachers simply utilize the LMS as a storehouse or repository of traditional assignments (Daniels, 2009).

Blended Learning

A blended learning environment utilizes face-to-face instruction with a teacher in conjunction with a learning management system to provide additional instruction (Black, Beck, Dawson, Jinks, & DiPietro, 2007). In a truly blended learning environment, the student would complete some instructional lessons and activities solely online while others occurred in the physical presence of a teacher. There is controversy about the term blended learning, and in this study, some of the online learning activities were facilitated by face-to-face interaction.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

In this study, I explored what features and characteristics of an online learning environment within a learning management system (LMS) could enhance online interaction and collaboration for elementary students. Consequently, in this chapter, I address two essential issues related to the research questions for this investigation. First, I present a conceptual framework of how learning occurs for individuals as they interact with the world around them and eventually collaborate with others to construct new meanings (Schunk, 2008). Then with the introduction of technology, including online tools, new opportunities arise to develop virtual communities of practice (Wenger, White, & Smith, 2009).

Second, I present a review of current empirical research that concerns the qualities of online learning that lead to interaction and collaboration among elementary students. Throughout this chapter, I detail various practices and effects of online learning; identify where there are knowledge gaps in the literature; explain why those gaps should be addressed; and propose how this study will contribute critical knowledge to the field.

Conceptual Framework

Constructing Meaning Individually

Individuals create new understandings as they make discoveries in the world around them according to the epistemology of Constructivism (Fosnot, 1996). Piaget (1954) theorized that knowledge is not an exact copy of reality, but rather, as children participate in new experiences,

they conceive actions and ideas that can be reinforced or discarded. When they encounter a new event that contradicts their current schema, Piaget determined that they are in a state of cognitive imbalance. He proposed that they must reach equilibrium by reacting to this contradiction in one of three ways (Schunk, 2008). First, they may choose to ignore the opposing information and keep their original framework. Their second option is to maintain both forms of understanding with different rules for each case in a process of assimilation, and in the third instance, they may construct a new meaning that explains the contradiction and encompasses their original understanding in a process of accommodation. Knowledge can then be viewed as occurring within the minds of children as they interact with the world around them and acquire new skills and information (Schunk, 2008).

Seymour Papert (1991) further expanded this "meaning-maker" theory of constructivism to include challenges and concepts particular to the digital age of computers. Papert described the dynamic learning processes students undertake while they are creating and designing original constructs using technology. Technology has the potential, therefore, to dramatically alter the learning environments within schools as students accept the responsibility of the transfer of knowledge and the production of knowledge. Some of the products that students collaboratively construct with technology may include computer programs, multi-media presentations, wikis, websites, digital games, podcasts, and graphical representations.

Papert (1993) also asserted that interacting with computers has fundamental effects on the intellectual development of children. When a child constructs and completes an activity or program with the use of a computer, the process of learning becomes more active and self-directed. The child is developing knowledge for a real purpose that takes on personalized meaning. It is the role of adults to provide the child with an environment that maintains a

supportive culture containing tools and elements used for new constructions of knowledge, such as computers. Papert (1993) described this environment as "discovery rich" since children are freely able to produce unlimited combinations with the available tools.

Constructing Meaning Socially

Vygotsky explained that beyond the spontaneous concepts that develop naturally as children respond to new information, they can also construct new information collaboratively within a facilitative learning environment (Fosnot, 1996). As they interact with others, they are exposed to the abstract ideas and formal operations that the other individuals have already constructed, and this new information can also cause a sense of imbalance that must be resolved cognitively. While contemplating this phenomenon, Vygotsky (1978) questioned what assists the mental process of developing new constructions of scientific concepts. He theorized that a school can be the context in which students develop the knowledge deemed culturally and historically significant by society, and their social interactions within the school transform their learning experiences (Schunk, 2008). Furthermore, the use of cultural tools in this social environment contributes to the cognitive change students undergo while constructing new knowledge.

One of the key propositions within Vygotsky's theory of social constructivism is that a zone of proximal development (ZPD) exists between what children are able to do individually and what they are able to do with the assistance of others (Vygotsky, 1978). As children interact with their peers and adults within that ZPD, using the tools of their culture, they begin to develop cognitively. Children bring their own understandings to the context of the classroom, and as they integrate these understandings with new experiences, they are able to construct new meanings. Therefore, a focus on guiding the child within the ZPD is not on the actual product or

the place where the child ends up, but instead, on the processes involved in learning. These processes are essentially the interactions that happen within the social learning environment, and Vygotsky emphasized that the most important function involved in this interaction is speech (Hung & Der-Thang, 2001)

Hung & Der-Thang (2001) further explained that all of the parts of a learning environment, the other individuals, the tools, the ideas, and problems, all contribute to a person's understanding. Learning is not passive; it happens as a child interacts within his or her environment, and it is particular to that child as an individual. According to Vygotsky (1978), a child has already established relationships defined by social practices within a learning community, and the child's history with these relationships and practices is what causes some type of learning outcome not just his or her actions.

Constructing Meaning Communally

As people share common interests and begin to interact with each other, they often help each other solve problems by offering information and advice (Wenger, McDermott, & Snyder, 2002). They find value in working and learning together, and while they are exploring new ideas and shared understandings, they begin to develop new tools, procedures, and structures that help them to work together as a group. This community begins to encompass their feelings of satisfaction as they contribute to the collective identity of the group and to its common body of knowledge. Wenger & Lave (1991) referred to this group of learners as a community of practice.

A community of practice describes how individuals dedicated to working within a shared environment construct common goals and shared meanings (Hung & Der-Thang, 2001).

Teachers and students working collaboratively within a learning management system have to negotiate and establish the rules of communication and etiquette that determine how a learning community will function. A community of practice entails more than just communicating with friends for pleasure; the commitment to the topic of shared interest is what creates the bond within the group (Wenger et al., 2002). This commitment drives the way they organize knowledge and formulate questions, and it establishes a sense of accountability. The students, therefore, are collectively conditioned to set higher goals for performance and achievement. Since the students and the teacher in this study were encouraged to interact and collaborate, the elements of a community practice were further investigated for inclusion into the design of the online learning environment.

Characteristics.

Communities of practice position learning in the context of lived experience through participation in the real world (Wenger, 1996). These communities can be of any size or duration, and the members are constantly learning, even if learning is not the intended goal. There does not need to be an intention to create learning, but rather, circumstances can be designed that make learning empowering and productive within the community.

There are three essential components of a community of practice (Wenger et al., 2002). First, there must be a shared domain of interest. That domain can be a particular subject or topic that is deemed valuable by the members of the community. When members enter into the community, their membership implies a commitment to the domain. Second, there needs to be a community. The individuals within the community interact with each other and build relationships that enable them to learn from each other. Mutual respect and trust are hallmarks

of their interactions. Third, there needs to be a practice. The methods and procedures that the members of the community use to pursue their goals arise from their participation and interaction within the community. Informal conversations among the participants as they share their ideas and experiences help to develop an evolving set of skills and strategies to be used when encountering similar issues or new obstacles.

Learning is fundamentally social (Wenger, 1996). Members of a community communicating about a common goal or working together to solve a problem are operating within the very core of learning. Social interaction is what drives that learning process. According to Wenger (1996), "There is no distinction between learning and social participation, and that is what makes learning possible, enduring, and meaningful" (p. 3).

Situated Learning.

Situated Learning entails that much of what is learned is pertinent to the situation in which it is learned (Lave & Wenger, 1991). Learning takes place in the real world context in which it is being utilized. Furthermore, learning is a social process, and instead of solely being transmitted from one individual to another, it is co-constructed by the members of a community working together to achieve a common purpose. The use of technology, in particular, within a learning environment can be explored within that particular situation, including the interactions of the members of the community, the tools they are using, and the artifacts they create with those tools (Angeli, 2008).

Legitimate Peripheral Participation.

Lave & Wenger (1991) noted that the process of learning is impacted significantly by the nature of the situation with the central defining feature of this process being legitimate peripheral

participation. When new members begin to participate in a community, they become more knowledgeable about the norms and practices within that community by participating in simple tasks and observing activities from the periphery. As they become more experienced, they may eventually move from the periphery of the group to become more involved in essential, core processes of that community (Lave & Wenger, 1991). Participating within the context of the community to achieve common goals and objectives stimulates the process of learning as each member constructs an identity in relation to the larger community. The view of learning transforms from the acquisition of knowledge into a process of social participation. This participation leads to a greater understanding of the relationships between new and seasoned members of the community, the activities in which they engage, and the artifacts they produce.

Constructing Meaning Virtually

The interplay of technology and community can lead to a virtual community of practice that Wenger et al. (2009) described as a *digital habitat.* Technology in such a community helps learners to interact with each other meaningfully and to collaboratively develop new understandings. Due to the availability of advanced technology including the Internet, software, and visual capabilities, it is continually becoming easier to communicate over distances in real time and in increasingly sophisticated methods (Amin & Roberts, 2008). This use of evolving technologies is generating increasing interest in how virtual environments support the construction of knowledge (Xiao & Carroll, 2007). Some of the methods of online collaboration used by virtual communities of practice include the following tools: (1) blogs; (2) wikis; (3) podcasts; and (4) computer simulations. Wenger et al. (2009) noted that as these tools become easier to use through experience and technological advances, then more members can participate in the formation of their online learning community.

When students participate in a blog, they are able to review and publish written content suggested by their teachers or peers (Barlow, 2008). The students and teachers collaboratively develop a unit of study that could be based on curricular standards or the students' interests (Sawmiller, 2010). Since the content is determined by the online learning community, the students take ownership of their work, and are often motivated to surpass the usual expectations for the amount of effort completed during the study.

Twitter is a social media tool that uses a technique called microblogging (Junco et al., 2011) because each post is limited to a maximum of 140 characters. In a study by Junco et al. (2011), an experimental group utilized Twitter for academic and co-curricular discussions in undergraduate students. The experimental group demonstrated a significant increase in engagement in the subject as well as higher semester grade point averages than the control group. The use of Twitter helped to build a strong learning community among students, and it encouraged greater participation among all students in the course.

A wiki is a collaborative piece of online writing that embodies the knowledge of the members of the learning community (Ma & Yuen, 2008). Through participation in a wiki, students are able to co-construct new ideas about a particular topic. There is no one owner of the wiki; it is developed by the entire community (Su & Beaumont, 2010). By observing the participation and communication of others within a wiki, a student may learn more about the specified topic, the learning process, and reflective thinking.

Podcasting involves audio content that teachers and students can post on the Internet and play directly from a computer or a portable mp3 player (Barlow, 2008). When students participate in podcasts, they are motivated to produce and share class assignments and projects with a global audience. According to Barlow (2008), when teachers introduce podcasting

activities to their students, they engage them "in the content because it is relevant, current, and real world" (p. 48).

Another type of technology-oriented activity that works effectively in the constructivist learning environment is the computer simulation (Winn, 2002). Computer simulations allow students to participate collaboratively in activities that they would never be able to complete in the real world. In science, they are able to conduct virtual experiments that safety and costs would prohibit students from accomplishing in actuality, and in social studies, students are able to visit virtual places around the globe from their homes and classrooms. These types of activities are considered constructivist because as students interact within the computer simulation, they are able to develop new understandings from their virtual experiences.

A virtual community of practice can be housed within an online system that can facilitate the use of all of the above collaborative tools (Wenger et al., 2009). Learning management systems (LMS), sometimes called course management systems (CMS), are virtual learning environments (Simonson, 2007). They are useful for teachers and students in supporting online learning as well as face-to-face classroom instruction. An LMS allows teachers to manage all of the typical activities involved in teaching such as designing quizzes, providing resources, and assessing student learning within an online environment. Students are able to log in at any time and from any location in order to access this information. An LMS can be used solely to deliver the instruction, or it can be used to supplement face-to-face instruction. An LMS enables teachers to utilize the collaborative aspects of the Internet like blogging, creating wikis, and podcasting, but in a closed, and consequently, safer online environment; furthermore, an LMS can also provide methods of organization and communication that may be beneficial for learners (Daniels, 2009).

A learning management system may be used to create classes that replace the traditional classroom model, enhance classroom instruction by using the online class as a supplement, or the classes can be set up as distance learning models (Henke, 2006). Online learning can be as effective as traditional face-to-face classroom learning for student achievement (Lin, Lin, & Laffey, 2008). According to Winn (2002), we are currently in an age, in which the student has unprecedented freedom to interact within online learning environments. In these learning environments supplemented by or created by technology, students continue to learn socially.

Empirical Research of Online Learning Environments

There are few studies that specify the comprehensive qualities of online learning that could enhance learning for elementary students (Means, Toyama, Murphy, Bakia, & Jones, 2009). In a meta-analysis of the effects of online learning for K-12 students, Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer (2004) noted that distance education can have the same effect on measures of student academic achievement when compared to traditional instruction. In the 14 studies included in this meta-analysis, 75 percent involved students in the secondary grades, and the other 25 percent of the studies focused on students in grades 3-5. Because of the prevalence and growth of online learning programs, Cavanaugh et al. (2004) iterated that online learning should no longer be compared to traditional face-to-face learning; rather, a focus should now be upon effective characteristics of online learning environments.

Empirical research has determined that the characteristics of interaction and collaboration via the use of technology are critical components in the construction of online learning communities (Lucey et al., 2009; Huges & Narayan, 2009; Becket, Amaro-Jimenez, & Becket, 2010). This interaction may occur in a variety of formats including discussion forums (Larson,

2009; Bai, 2009), blogs (Sawmiller, 2010), wikis (Su & Beaumont, 2010; Ma & Yuen, 2008), and collaborative projects (Hernández-Ramos & De La Paz, 2009; Cameron, Morgan, Williams, & Kostelecky, 2009). Through these endeavors in online learning environments, students can learn new information and processes (Woo & Reeves, 2007); however, a fundamental responsibility still exists to determine what particular features within an online learning environment, e.g., an LMS, can cause interaction and collaboration.

Characteristics of Effective Online Learning Environments

Cavanaugh et al. (2004) cautioned about transferring the findings of research on adults in online learning to children as the learning experiences of young students may present fundamentally different characteristics. In response, Rice (2006) also conducted a meta-analysis of research on online learning for K-12 students and organized the resulting information into three following categories: (1) *learner characteristics*, (2) *student supports*, and (3) *affective learning domains*. Learner characteristics refer to the personal attributes of the students that may lead to their success or failure within an online learning environment. These characteristics may include motivation, self-esteem, self-efficacy, self-direction, and interpersonal relationships. (Rice, 2006).

According to Rice (2006), there were few studies that addressed *student supports* in K-12 online learning, but in research regarding online learning for adults, the following findings of student supports were present: instructional support, technical support, sense of community, and the design of the learning environment. There was evidence, however, that when students interacted with their peers, they were more likely to persist with challenging problems (Frid, 2001). Cavanaugh et al. (2004) also posited that the teacher plays a significant role in the outcomes of online education, and Blomeyer (2002) explained that the role of the teacher begins

to shift from being the sole provider of knowledge to becoming more facilitative as there is an increased emphasis on authentic tasks and project-based work that is often described as student-centered in a constructivist learning environment.

Finally, Rice (2006) acknowledged that *affective learning domains* are related to student supports and learner characteristics and describe the behaviors and attitudes that a student exhibits within a virtual learning environment. How students interact within this context is a possible key to their online performance. Rice (2006) referred to the research of Moore (1989) who suggested that there are three types of interaction within online learning: learner-to-content, learner-to-instructor, and learner-to-learner. Studies involving adult learners noted that interactions with their instructors and other learners are important components of their satisfaction and retention in online learning programs. Rice (2006) concluded his meta-analysis with the call for more research in the interactive aspects of online learning for K-12 students with instruction that addresses the cognitive and social processes of knowledge construction.

Types of Interactions within Online Learning

In a meta-analysis of 74 studies involving students as young as kindergarten to adult learners, Bernard et al. (2009) explored the role of interaction within online learning environments. The researchers defined interaction as the learner's engagement with the content, other learners, and the instructor of the course with the goal of increasing understanding (Bernard et al., 2009). All of these types of interaction may also occur in a face-to-face setting in support of the interactions that are happening in the online learning environment. Student-to-student interaction can be synchronous, as in live chatting, or it can be asynchronous, as in discussion forums or email, and it is essential for learning and support. Interaction between a

student and the teacher may also be synchronous or asynchronous, and it can stimulate student interest, self-direction, and self-motivation. Lastly, interaction between the student and the content refers to "students interacting with the subject matter under study to construct meaning, relate it to personal knowledge, and apply it to problem solving" (Bernard et al., 2009, p. 1248). This type of interaction refers to reviewing materials, watching videos, participating in simulations, completing assignments, and working on projects.

Bernard et al. (2009) noted that although opportunities for collaboration and interaction were provided to the students, they did not always choose to participate in those activities. Furthermore, when they did choose to participate, they did not always do so effectively. Due to this finding, Bernard et al. (2009) positioned that online learning environments should not be seen as inevitably conducive of learning or automatically nurturing of communities of practice; rather it is the purposeful design of those environments that is essential to the desired learning processes. How students perceived their online interaction was also a better predictor of their satisfaction in an online environment than actual measures of their interactivity. In light of this finding, opportunities for all three types of interaction should be included even if the students choose not to participate in those activities.

To promote high-quality interactions in online learning, Bernard et al. (2009) recommended that course features should promote high-quality learning activities, such as cooperative learning to develop positive interdependence and accountability among learners. Planning strategies for problem-based and guided discovery may also promote quality student interaction with content, and effective student and teacher interactions may be developed with a focus on higher-order thinking and comprehension rather than on recalling factual information, procedural details, or assessment items. Additional interactions could be encouraged with

multimedia and multiple modes of presenting information, especially for developing an understanding of complex concepts. Finally, Bernard et al. (2009) noted that the range of tools and features available within learning management systems has yet to be specifically researched in their ability to enhance interactions, and the researchers encouraged additional research with these applications in online learning for elementary schools.

Design Principles for Improving Interaction

Abrami, Bernard, Bures, Borokhovski, & Tamim (2011) further investigated the role of interaction, as observed within the meta-analysis of Bernard et al. (2009), and determined that it should have a more intentional focus within instructional design in order to engage learners. In this focus, students are encouraged to consider the purposes of interaction to help develop skills in self-regulation, multimedia learning, motivation, and collaboration, and Abrami et al. (2011) cited evidence of how these abilities can be facilitated through the design of online interaction. As students improve in self-regulation, they may learn how to set goals, demonstrate personal interest, focus their attention, and achieve more self-control. When students interact with well-designed multimedia content in an online course, they are better able to recall and retrieve information as well construct new meanings. This type of interaction includes processing the multimedia through online activities and presentations as well as generating multimedia through student projects (Abrami et al., 2011).

Factors that influence motivation can also be implemented within the design of online learning environments to enhance students' beliefs in self-efficacy, encourage higher levels of interest, and develop additional goal-setting and self-direction (Abrami et al., 2011). Among these factors are opportunities for students to make choices, pursue their interests, focus on the

value of activities, and practice personal and social responsibility. Additionally, Abrami et al. (2011) recommended that collaborative and cooperative learning principles should be included in the design of online learning because the ultimate goal is for students to interact with each other. This student-to-student interaction has been proven to lead to higher levels of achievement as students learn from each other through positive interdependence and additional individual accountability (Abrami et al., 2011). According to Abrami et al. (2011), this individual accountability involves two components: (1) There is an expectation that everyone is responsible for his or her own learning, and (2) every student is also responsible for helping everyone in the group to learn more effectively.

As noted earlier, although there are some studies that focus on online learning activities for secondary students, fewer studies focus on online learning for children in the elementary grades (Cavanaugh et al., 2004). There are, however, some studies on particular tools that may be found within online learning environments. In this review, I included studies that focused on particular meaning-making, collaborative, and communicative uses of online technologies, tools, and processes with students. More specifically, I explored studies that delved into how students and teachers used online technologies to interact with others and to develop strategies that facilitated their learning experiences.

This interaction, collaboration, and negotiation of shared understandings and procedures are all elements of a community of practice (Wenger et al., 2002) In the following studies, I attempted to ascertain the learning contexts as well as the tools and characteristics that were involved in the investigations. In designing an online learning environment for use with elementary students, it was necessary to have an understanding of existing research in that area in order to incorporate those elements within the design. However, in some instances it was

necessary to investigate studies that explored the use of online learning in higher education since there was a scarcity of research available in K-12 settings.

Collaborative Blogging to Improve Writing Skills

In a qualitative study of the attitudes of third grade students toward writing as they participated with teachers in a blogging project, Drexler, Dawson, & Ferdig (2007) found that this mode of writing increased students' motivation to write. The impetus for the research was an established need for a greater focus in the area of writing. Blogging is a form of collaborative writing that enables multiple individuals to collectively work together to complete a writing activity via the Internet.

Drexler et al. (2007) paired 18 third grade students with preservice teachers from the University of Florida. Each student was required to research a Native American tribe from Florida and then to write a five-paragraph essay on that tribe. A preservice teacher was partnered with each student as a guide to provide feedback through the entire project over a period of nine weeks. To complete the project, the students and preservice teachers utilized a variety of software and technology tools, including the following: *Inspiration*, *MediaBlender*, and *Blogmeister*. The students mainly used a computer lab with 20 computers to complete their assignments, but they were also able to perform additional writing on their blogs from their home computers, if necessary.

The researchers attempted to capture student attitudes toward writing before and after the project by collecting the following forms of data: (1) writing surveys; (2) the teacher's reflective blog/field notes; (3) student blogs; (4) interviews; (5) student concept maps; and (6) student five-paragraph presentations (Drexler et al., 2004). The assembled data were read and reviewed to

establish familiarity with the material; disaggregated into meaningful categories; and transformed into findings and implications.

Data analysis resulted in seven categories (Drexler et al., 2004). Three of these categories were intended outcomes directly related to the research question – attitudes, motivation, and writing quality. The collaborative blogging improved the students' attitudes toward writing, and it was the feedback generated from this collaboration, and not the use of technology itself, that increased the motivation of the students to write. Some of the students discussed the use of the computers as motivating, but all of the students described the communication with their teacher partners as a favorite aspect of the project. Finally, the collaborative blogging improved the students' writing abilities, and the students learned new skills related to successful writing.

The remaining four categories in the above research were unintended outcomes of the study – curriculum integration, technical skills, visual literacy, and varying student capabilities. Drexler et al. (2004) explained that as the partner teachers provided the students with links and activities to additional websites for research, the students were excited to learn more about their topics and began to draw conclusions, transfer knowledge, and make comparisons and contrasts on their own time, even during recess. They became more proficient with technology and at conducting searches on the Internet even though technology-related instruction was not provided. In addition, the students began to develop visual literacy skills with their illustrations, including digital pictures and original drawings, as they transformed their essays into online presentations. Finally, the collaborative blogging led to differentiated instruction by employing various modalities of learning activities that helped every student to succeed.

Beyond the development of additional academic skills in written communication, Drexler et al. (2004) noted that this blogging experience was a constructivist tool for learning. The students created original content and posted it to share with others, causing the students to assume greater responsibility for further inquiry. Essentially, the students developed community knowledge through the collaborative use of technology as they acquired new abilities in a manner that supported all of their different learning styles.

Organizing Community Knowledge by Writing in Wikis

Ma & Yuen (2008) investigated the possible impacts of writing wikis on the learning experiences of undergraduate student journalists. A wiki is a Web 2.0 tool that allows multiple users to collaboratively create and edit an online document; in this way, a wiki encourages social interaction among the participants. However, many educators are still unsure if Web 2.0 tools support learning effectively. So, in this study, the authors provided the following purposes for this investigation: (1) to review literature on the impact of Web 2.0 technologies on learning; and (2) to examine how wikis helped students learn news writing.

The authors detailed how online communities affect learning by providing their members with resources and support (Ma & Yuen, 2008). In this online environment, users can add and edit new information that initiates further learning and helps the other members to understand more complex ideas. Beyond the sharing of understandings, the members can also share resources that everyone can access. The more users there are in the wiki, the greater the potential that the community knowledge has to grow. Furthermore, as students utilize a variety of media within a wiki, the media affects how they structure their understandings of that content.

From their review of the existing literature to fulfill their first purpose of this study, Ma & Yuen (2008) summarized the information into four themes. (1) Wikis allow users to generate content via a *learn-centered system design.* (2) Wikis *facilitate the drafting process.* (3) Wikis allow users to efficiently edit content by providing *a complete support to revision in the writing process.* (4) In wikis, news stories can be built through a *continuous organization of content.*

For this investigation, Ma & Yuen (2008) set up a wiki to support students as they learned news writing through participation in that wiki. The data were collected in two phases. The first phase contained all of the students in the four-year journalism program; meanwhile, the second sample included only those students in the first year of the program. An open-ended questionnaire was distributed to all 526 students in the program during the first phase, and it was completed and returned by 138 students. In the second phase, the aim was to target a specific group within the learning community to investigate the impact of the wiki on student learning. In this phase, all of the students in the first year of the program completed a survey of writing self-efficacy, and then content analysis was conducted on the wiki of a collaborative news report.

In their findings, Ma & Yuen (2008) noted that revision was important for effective writing; the number of times a wiki was edited correlated positively to writing performance. Even after written work was graded, the students were still motivated to continue revising their work. Although the authors felt further research was needed to confirm that wikis led to improved writing, they noted that the behaviors in revision that were encouraged through the use of the wiki led to better written work.

Ma & Yuen (2008) provided some practical implications for implementing wikis to support writing instruction. The following three writing modes should be utilized to help

students learn from wikis: (1) *Individual authorship:* causes students to assume responsibility for their independent work; (2) *Group authorship:* creates interaction among peers to help them learn from each other; (3) *Large-scale collaboration:* encouraging everyone to work on a piece of writing thereby developing greater community knowledge.

Mobile Learning and WebQuests in Environmental Education

Chang, Chen, & Hsu (2011) explored the integration of WebQuests with mobile learning to facilitate sixth graders' learning experiences in environmental education. A WebQuest is an inquiry-oriented activity that allows students to interact with resources that are available over the Internet. The authors wanted to ascertain the effects of the use of the Internet-based technology tool of the WebQuest within different contexts. They also wanted to determine how a student's learning performance could be affected by the learning environment and their satisfaction with learning activities. In this experiment, learning performance was indicated by the students' work on their assignments and their participation in activities.

There were 103 sixth grade students in Taiwan who participated in this quantitative study by Chang et al. (2011), and the environmental education concepts these students studied during this investigation were embedded within a unit called Resource Recycling and Classification. The students were divided into three groups. The experimental group was comprised of 35 students, and these students received a combination of hands-on, exploratory learning in a special room of the school, termed the *treasure house*, along with the use of the WebQuest in an outdoor education environment. Two control groups were utilized for this five-week study. The first control group only received traditional, face-to-face instruction in the concepts of an environmental protection unit. The second control group underwent traditional classroom

teaching in conjunction with the WebQuest. All of the students completed a pretest at the beginning of the instructional unit to determine their base knowledge of the environmental education concepts. The results of a one-way ANCOVA (Analysis of Covariance) showed that the three groups had no significant differences between their levels of base knowledge (F =.638, p = .530 > .05) in environmental science.

In the traditional instruction of the first control group, the students learned about resource recycling and classification through listening to lectures with the teacher available to answer their questions about the environment (Chang et al., 2011). They also watched films on the topics of environmental protection and resource recovery in order to achieve a deeper understanding of the content. While completing these activities, the teacher spent at least one or two hours each week on the environmental education concepts in the unit.

Both the second control group and the experimental group used a WebQuest that included the following six modules: *Introduction, Task, Process*, *Resources, Evaluation*, and *Conclusion* (Chang et al., 2011). This WebQuest addressed the same environmental education content as the unit in the traditional teaching method; however, the students in these groups participated in a variety of activities, including having the students design PowerPoint presentations and websites of the information that they had learned. The difference between these two groups is that the second control group completed their learning activities in the computer-classroom using computers while the experimental group used mobile devices (Personal Data Assistants – PDAs) to complete the WebQuest in an exploratory-oriented room, the *treasure house*. The experimental group also used computers within the *treasure house* to design their websites and PowerPoint presentations.

At the end of the five-week period, all of the students from the three groups completed the same assessment to evaluate their understanding of the environmental education concepts. According to Chang et al. (2011), the various learning strategies led to a significant difference in post-examination achievement in that the groups utilizing the WebQuest demonstrated higher achievement than the group receiving traditional instruction alone. Although compared with the achievement of the second control group (using the WebQuest combined with more traditional instruction in the computer lab), the experimental group (using the WebQuest with outdoor instruction) showed no significant difference ($p = .056$) on the final assessment. The experimental group did, however, demonstrate a higher learning performance when the factors of their satisfaction with the learning process and the contents of their assignments were evaluated.

The results of the experiment demonstrated that utilizing the outdoor setting in combination with the learning activity of the WebQuest improved student satisfaction, degree of participation, achievement, and learning performance. The experimental group designed richer content on their learning tasks through their observation and practice of the processes of resource recycling and classification. This revealed that students also developed critical thinking skills while they were situated in a collaborative setting that reflected the concepts that were being taught.

Online Forums to Develop Student Inquiry

Another study involving computer-supported collaborative learning among elementary students was conducted by Tan & Seah (2011). In this study, the authors explored questioning behaviors among elementary students engaging in inquiry science using the *Knowledge Forum*. This tool was an asynchronous online discussion forum designed to encourage students to

collaboratively investigate problems of a scientific nature. One of the important elements of scientific inquiry is questioning, and through online discussion, the authors attempted to determine if students could acquire that skill in a knowledge-building environment.

Tan & Seah (2011) noted that the participants in this contextualized study were between 9 and 10 years of age in the fourth grade of a suburban elementary school in Singapore. There were three fourth grade classes involved in the investigation with approximately 40 students in each class. Two of the classes were taught science by the same teacher each day, while the third class had a different teacher. One of the classes had a higher average performance (76.2%) on the third grade science examination than the other two classes (57.6% and 55.5%). Both of the teachers in this study utilized the online *Knowledge Forum* to complement their face-to-face instruction between April and October 2007. The students generated ten online discussion forums during this time period, and the authors of the study analyzed these discussions. As their teachers posted questions within the *Knowledge Forum,* the students had to answer those questions and respond to their peers' responses with further questioning.

Although both teachers utilized the *Knowledge Forum,* they had different instructional approaches (Tan & Seah, 2011). The first teacher generated challenging questions or puzzles related to his face-to-face science instruction and put the students into groups to discuss their ideas within the *Knowledge Forum* to solve those puzzles. Furthermore, he required the students to summarize their understanding of the topics and make connections to the topics from their personal experiences. The *Knowledge Forum,* therefore, assumed an integral strategy within of his science lessons for sharing, building, and improving ideas.

The second teacher predominantly utilized a face-to-face teacher-directed approach (Tan & Seah (2011). She generally led discussions, gave presentations, and had the students complete follow-up worksheets. She used the *Knowledge Forum* as an activity to supplement her face-to-face instruction after they had completed the preceding activities. The students would then answer questions in the *Knowledge Forum* about those activities and what they had learned in class.

Tan & Seah (2011) contrasted the types of questions the students developed online within the three classes in order to understand the impact of knowledge-building pedagogy in this qualitative study. They developed an analytical framework, termed *Ideational Functions of Questions* (IFQ) framework, to explore the questioning behaviors of the students within the *Knowledge Forum*. This IFQ framework enabled them to assess and categorize the content and functions of the questions the students posed within their online discussions. After they had classified the questions into categories, they further clustered those categories into three main kinds of questions: *Scientific, Epistemological,* or *Meta-discoursal*. According to the authors, *Scientific* questions attempt to generate information about specific scientific concepts. *Epistemological* questions search for resources, evidence, and criteria that support scientific concepts; and Meta-discoursal questions inquire further about ideas posted in the *Knowledge Forum*.

After Tan & Seah (2011) had developed the IFQ framework, they applied that framework specifically to three online discussion forums developed by the first teacher. These forums were chosen for the following reasons: (1) the first teacher had developed a higher functioning knowledge-building environment; (2) the teacher's effect on the forums would be the same since he taught all of the classes involved; (3) the forums all focused on the same scientific topic of the

digestive system. A different task had been originated by the teacher within each of the discussion forums. The first forum asked the question, "Why does the human body need the digestive system?" This forum received the fewest number of questions probably because it was asking the students for factual information that they could locate within a textbook or from another source. Receiving the most questions was the second forum to its original question, "Do you see similarities between household items and parts of the digestive system?" This enthusiastic response was due to the fact that it caused the students to connect the scientific information to items they encountered in their daily lives. The final forum gave some information about an animal's teeth and then posed the open-ended problem-solving question, "What is your theory of what the animal eats?" This forum received the most even distribution among the three types of questions in the IFQ framework, and the highest frequency of epistemological questions as it required an understanding of many scientific concepts in order for the students to justify their responses.

Tan & Seah (2011) developed several conclusions based on their analysis of the discussion within the *Knowledge Forum*. First, the types of online questions generated by the students may be indicative of the pedagogical beliefs and practices that are part of the culture of learning that had developed within the classroom. In addition, using the framework could be effective for teachers to evaluate the types of inquiry tasks they develop for students as the nature of each task affects students' questioning behaviors. Finally, fostering desired student behaviors in an online environment requires intentional and continual support from the classroom teacher. Not only does the task influence the inquiry, but the teacher's online presence has an impact on the types of learning behaviors that the students exhibit.

The Importance of Social Discourse in Online Learning

In the above investigation, Tan & Seah (2011) explored questioning skills related to academic concepts in the area of science, and early in the study, they noted that the students had "misused the *Knowledge Forum* as a social chat tool" (p. 1683). The role of the social interactions of elementary students as an aspect of online learning, however, was examined by Maher (2009). According to Maher (2009), students are productive users of new information and communication technologies, and their online interactions are very different from interactions in the face-to-face learning environment. Many of these online interactions tend to be less formal than in the classroom, and their online communication contains a high level of social content.

This study took place in Australia and explored the online interactions of fifth and sixth grade primary students as they participated in online discussions with seventh grade high school students about school-related topics. Maher (2009) referenced earlier studies of online communication of people of all ages, and a recurring conclusion was that approximately half of all online communication for young people was social in nature. Most of these studies focused on older learners, and he noted the need for additional research on the online interactions of students within the context of the learning environment.

Maher (2009) utilized a qualitative methodology in this investigation and collected data through observations, field notes, interviews, discussions with teachers, and by recording online interactions. The study was conducted over 12 months and involved 22 students (11 to 12 years of age) and their teacher in a fifth and sixth multigrade classroom. The students used computers both at home and in the classroom to complete curriculum assignments that involved accessing

the Internet. During the study, the researcher assumed the role of a teacher/researcher and worked with the teacher and students while they were completing their online tasks. He interviewed the students at the onset of the study to determine how much they used the Internet and with whom they communicated over the Internet. As they completed their projects throughout the study, Maher (2009) continued to interview the students in focus groups about their online work.

To identify themes in the data, Maher (2009) employed a grounded theory approach. He transcribed all of the data into a written format and coded information from the data into categories based on the content of the students' interactions. The four types of content within interactions that he noted were as follows: (1) *technical content*; (2) *navigational content*; (3) *social content*; and (4) *curriculum content*. As he delved into the social content of the students' interactions he noted two additional categories – *opening/closing* and *topic talk.*

Since the study was occurring within Australia, the sixth grade students would be leaving primary school at the end of the year to matriculate to seventh grade (high school) the following year (Maher, 2009). This project entailed that the seventh grade students would share information about high school life with the primary school students. The goal was to help the younger students feel like they were part of the school community the following year. The students at the two different schools interacted with each other online for 40 minutes each week to write a script for a play that they would eventually perform for each other at the end of the school year.

The theoretical framework that guided Maher's (2009) study was sociocultural discourse. This theory views learning as a social process, and through interactions, learning occurs.

Interactions are composed of verbal and nonverbal characteristics and communication and manipulate the tools created by the participants to solve relevant issues. The tools not only facilitate the activities involved in the interactions of the students, but they can also shape and define the types of activities that the students are able to complete.

In Maher's (2009) investigation, there was a high degree of social chat throughout the interactions that took place among the students while completing the projects. The social chat helped to create further actions on the collaborative projects and future communication. For example, the students engaged in openings and closings as they greeted each other and said goodbye at the end of each session. Without face-to-face cues, it was essential for the students to establish relationships with these greetings. In their online discourse, some of the students began to use abbreviations to informally express their greetings and also utilized limited punctuation. In this way, they were able to distinguish some individuality from the rest of the group of students while also maintaining some similarity. Due to the lack of visual cues, these openings and closings took longer than they would in a face-to-face situation.

Maher (2009) termed the second type of social chat in which the students engaged as *topic talk.* In these types of interactions, the students began discussing their interests and hobbies, and with these interactions, students began to establish norms for the group as they mentioned the popular television shows and music that they enjoyed. In this manner, they were able to again show that they had some individual identity but also remain similar to the other students.

According to Maher (2009), social talk is rarely encouraged by face-to-face classroom teachers although students often participate in social talk in their regular classrooms. This type

of online social chat was an important precursor to other types of online activities. By establishing relationships with their online peers, they were better able to move on to formal aspects of the discussion. Maher's (2009) final conclusion was that the way online learning is planned, organized, and assessed needs to be reevaluated to include more opportunities for social chat before moving on to curriculum-related topics.

Social Ability as a Determinant of Online Success

Lin et al. (2008) explored the importance of an individual's social ability as a determinant of success within an online learning community. Social ability is defined as a person's capacity to associate with other members of the learning community and to use the resources and tools available in that context to achieve something of value. In their study, they noted that there are three factors involved in social ability including *social presence*, *social navigation*, and *social connectedness*. All of these factors were positively correlated with perceived learning satisfaction.

Online learning has shown that it can be as effective as traditional face-to-face instruction, but it tends to have a higher rate of dissatisfaction as seen in the high rates of attrition of online students (Lin et al., 2008). One reason for dissatisfaction with online learning may be more related to social interaction than to the specific process of learning online. Students who perceive higher levels of interaction exhibit more satisfaction with their online learning. This study addressed the need to test how social and motivation factors contribute to online learner satisfaction.

In this quantitative study, Lin et al. (2008) surveyed 250 university graduate students in education who were enrolled in eleven online courses in a distance learning program. The

courses in the program taught technology applications for use in education, and they were all fully online with no face-to-face sessions. The online environment provided access to the course learning space, additional materials, discussion boards, email, and instant messaging.

Lin et al. (2008) utilized a standardized 42-item instrument to evaluate students' perception of the social experience in an online learning environment. All of the items were measured using a 7-point Likert scale. On average, students had positive perceptions toward the following aspects of successful online learning: social ability, intrinsic goal orientation, self-efficacy, and task value. They also had a relatively high level of satisfaction with their learning experience in the distance education program. The findings showed that the online learners' sense of being connected to their learning community may have been due to the level of presence and closeness they felt while interacting with their online classmates rather than with the instructor. As they became more comfortable projecting themselves socially through discussion and interaction, the more likely they were to form a class community.

Improving Motivation with a Web-Based Learning Environment

Wang & Reeves (2006) conducted a design-based research experiment in which a 10th grade science teacher used a web-based learning environment to improve students' motivation to learn science. This learning environment was implemented in the classroom as a three-day student-centered learning activity. Qualitative data were collected including individual student interviews, teacher interviews, motivation questionnaires, and observations. This study utilized a design experiment approach in creating the innovation and then utilizing it within the context of the classroom in order to understand student motivation as well as directions for future research.

Working with an experienced high school teacher, the researchers designed an interactive web-based learning environment about fossilization, and factors that were believed to enhance intrinsic motivation were integrated into the instructional design of the learning tool (Wang & Reeves, 2006). The contents of this environment were adopted and modified from high school geology textbooks, instructional video, and several journal articles. The most significant finding of the study was that the students were more interested in learning about fossilization due to the web-based learning environment than they were to other units of study in earth science. Wang & Reeves (2006) recommended the inclusion of themes of challenge, control, curiosity, and fantasy in future instructional designs in order to increase student motivation.

In the above example, the innovation of the web-based learning environment included the interactions that occurred among materials, teachers, and learners, and they were so contextual that they might not be generalized to other situations (Collective, T.D.-B.R., 2003). The web-based learning environment was a product of that context. Another reason for developing that particular innovation was that the researchers were able to study a practice that was just emerging and not fully understood (Wang & Reeves, 2006). Some technology tools are so advanced that they cannot be left up to the individuals being observed (the teacher and students) to design on their own (Collective, T.D.-B.R., 2003).

Instructional Uses of Learning Management Systems

Lee (2005) surveyed and interviewed undergraduate foreign language students at the end of the semester about the use of the Blackboard LMS to determine their perspectives and attitudes toward using that web-based learning environment. The results of the study showed that easy access to all of the materials and tools that were available online facilitated the learning

process. The students felt that the use of Blackboard enhanced their organizational skills and motivated them to become independent and self-directed learners.

Some students commented that the experience of using Blackboard gave them a personal feeling of accomplishment and a positive learning experience. The use of the web-based learning environment helped to provide a sense of community in which students were able to learn collaboratively (Lee, 2005). The daily writing assignments helped to develop the students' writing skills in the foreign language, and communicating collaboratively in the chat room encouraged the students as they developed their linguistic skills. The learning management system assisted with the foreign language instruction by supplying additional tools for organization and for providing a collaborative learning environment.

The use of a learning management system (LMS) is an emerging practice in elementary education, so design-based research may enable the observation and development of learning activities that may be beneficial to educational practices in online environments (Winn, 2002). An LMS can be either proprietary or open-source (Simonson, 2007), and the most well-known proprietary LMS is Blackboard. This software product can be purchased or licensed from the vendor and installed by the learning institution. Open-source course management systems are web-based learning environments that are maintained by the users, and the most well-known open-source LMS is Moodle. Another open-source course management system is the Sakai project. It was started with the purpose of creating a course management system that could compete with proprietary systems, and it is continuing to grow rapidly as more organizations begin to use that LMS.

Because there is more emphasis on student-centered instruction during the learning process and the integration of technology within the classroom, teachers can utilize more

collaborative pedagogical processes (Wozney, Venkatesh, & Abrami, 2006). Calvani, Fini, Molino, & Ranieri, (2010) studied online interactions within an LMS and noted that knowledge is constructed through dialogue and discussion. The underlying idea in this computer-supported collaborative learning is that in an online collaborative group, there are opportunities for discussion and analysis that lead people to restructure their own thinking about a topic (Lucey & Grant, 2010).

According to Black et al. (2007), an LMS needs to be compatible with the particular culture of the environment in which will be used. If an LMS is determined to be better than its competitors, it is more likely to be adopted. Users need to be able to try out an LMS and interact with the technology in order to feel comfortable with that innovation. In addition, being able to observe how the LMS produces user satisfaction with the level of support that is provided can help the adoption process. Finally, an LMS that the users may view as simple to use and implement is also more likely to be adopted. Skilled personnel are often needed within the learning environment who can shield the user from the complexity of an LMS while simultaneously assisting the user with the LMS.

Black et al. (2007), explained that most learning management systems contain basic features such as options for creating quizzes and tests, discussion forums, a calendar, methods for working collaboratively, and devices for grading and assessment. Winn (2002) suggested that these online environments allow learning to become authentic as users deal with problems that exist in the real world. They are beginning to be used more in K-12 education, but the impact of learning management systems has yet to be determined (Simonson, 2007). More research needs to be conducted on this impact and on how this technological tool is being used to improve instruction.

Summary

The learning theories and empirical research discussed in this chapter provide an understanding of the need to provide children with opportunities to construct meanings out of new discoveries (Fosnot, 1996; Papert, 1993; Schunk, 2008). The activities of learners and their environment are intertwined; therefore, learning cannot happen in isolation because how it occurs within the environment gives it authentic meaning (Hung & Der-Thang, 2001). Furthermore, the literature suggests that when individuals interact and collaborate with each other in communities of practice that they are able to socially construct new understandings (Wenger & Lave, 1991; Wenger, 1996; Wenger et al., 2002). The tools that belong to that learning culture also contribute to the process of learning as students utilize them to construct new meanings (Angeli, 2008; Schunk, 2008).

Within an online community of practice, students can utilize technology tools that may enhance their learning by encouraging interaction and collaboration with other students (Wenger et al., 2009) Those technologies can support the construction of knowledge within online environments (Xiao & Carroll, 2007). Moreover, the review of empirical research revealed that the following online tools can enhance students' learning experiences: (1) blogs (Drexler et al., 2004); (2) wikis (Ma & Yuen, 2008); (3) WebQuests (Chang et al., 2011) (4) discussion forums (Tan & Seah, 2011); (5) live chat sessions (Maher, 2009); (6) interactive websites; (Wang & Reeves, 2006); and (7) learning management systems (Lee, 2005).

Of course, some challenges do exist when attempting to utilize technology to increase collaboration among students. Although many of these challenges are linked to the access, training, and ethics related to the use of technology and resources (Matzen & Edmunds, 2007),

other challenges involve changes that must be made in the pedagogy currently being employed by teachers within typical classrooms (Richardson & Swan, 2003). In addition, the needs of students with various learning styles and challenges must be considered if students are to achieve optimum success (Green & Gredler, 2002). When online learning opportunities are being developed, educators must make specific design decisions regarding how students will be spending their time online; what types of technologies will be used to deliver instruction; and what are the expectations for student performance (Oliver, Kellog, Townsend & Brady, 2010).

Although learning management systems (LMS) can be utilized to facilitate these tools for online learning, the impact of an LMS in K-12 education has yet to be determined (Simonson, 2007). Means et al. (2009) noted that information on online learning in the elementary grades is scarce; therefore, researchers are cautioned about generalizing the impact of online learning from studies in higher education to elementary students. Cavanaugh et al. (2004) also cautioned that the learning experiences of young students may present fundamentally different characteristics than those of adult learners.

Rice (2006) called for more research in the interactive aspects of online learning for K-12 students with instruction that addresses the cognitive and social processes of knowledge construction. However, an online learning community has to be able to manage and support these interpersonal interactions in addition to providing suitable and dynamic tools and materials (Wenger et al., 2009). Bernard et al. (2009) noted that the range of tools and features available within an LMS has yet to be researched in their ability to enhance interactions and encouraged additional research with these applications for elementary schools. This type of online experience can create a structural dependency on everyone within the community to strive toward its success (Wenger et al., 2009).

Based on the recognized need for more research in online learning for elementary students, in this study I explored the design and implementation of an online learning community within an LMS in a traditional, face-to-face elementary classroom. Over a five-week period, the teacher and students within a fourth grade classroom participated in this study of the use of an LMS to encourage online interaction and collaboration. I specifically investigated the following questions:

1. What features and characteristics of an online learning environment within an LMS encourage collaboration in a fourth grade classroom?
2. How does interaction among students with each other, their teacher, and the content occur and develop within an online learning environment?
3. How does participating in an online learning environment enhance learning for the fourth grade students involved in this study?

CHAPTER III

METHODOLOGY

Throughout this study, I designed, implemented, and modified an online learning community in a fourth grade classroom according to the methodology of design-based research (Collective, T.D.-B.R., 2003). Design-based research can employ qualitative, quantitative, or mixed methods approaches to pursue research questions, and Hoadley (2004) iterated that no methodology should exist in isolation. In design-based research, the researcher should interweave methodologies, if necessary, to understand, analyze, and explain the phenomenon. Since there is very little research on the use of online learning communities in elementary classrooms, the preliminary, exploratory goals of this research were best suited to qualitative inquiry and analysis.

Bell (2004) noted that because of the complexity of learning, it must be viewed through multiple lenses and understood through multiple methods of research. Some research methodologies are able to explore innovations that can be applied to a variety of settings while others are most valuable within the scope of a particular context. Design-based research aims to intertwine theory with practice by exploring the use of a particular innovation within the context of a specific learning environment. It attempts to understand teaching and learning processes when the researcher is simultaneously involved as an educator (Kelly, 2003).

According to Barab & Squire (2004), design-based research investigates how an innovation is used within a local context, and the role of the researcher shifts and becomes more involved in the actual design and redesign of the innovation. Context is also crucial to qualitative research, as researchers are interested in understanding how individuals within that particular setting interpret their encounters, construct their environments, and make new meanings from their experiences (Merriam, 2009). In this investigation, there is a synergy between the design of the innovation of the online learning community and the qualitative methods used for understanding the experience of its implementation. Therefore, both methodologies were utilized in an attempt to understand the interaction of the participants as they constructed meaning from their learning experiences within the context of the online learning community (Barab & Squire, 2004; Merriam, 2009).

The Synergy of Design-Based and Qualitative Research in Education

The Role of Context

Ann Brown was a leader in the design research movement (Collins et al., 2004) and worked to address the following issues: (1) theoretical questions about the nature of learning in context; (2) learning phenomena in the real world; and (3) research and findings derived from formative evaluation. Brown (1997) described herself as an educator and a researcher who promoted the design of innovative educational environments and conducted research studies within those settings. Brown (1992) attempted to create communities of learners within classrooms where students were actively involved in collaboration, inquiry, reflection, and the creation of original projects, and she argued that such a classroom is the ideal laboratory for the study of the processes and theories of learning. Barab & Squire (2004) explained that design-

based research was introduced with the expectation that researchers would continually redesign aspects of the innovation being practiced within a particular context.

In the history of qualitative research, early sociologists and anthropologists first recognized the importance of context as they strove to understand the stories and experiences of people attempting to make sense of their worlds (Bogdan & Biklen, 2007). Margaret Mead was an anthropologist who employed the traditions of her field in the context of the classroom to explore "how teachers interacted with students" (Bogdan & Biklen, 2007, p.9), and she explained how teachers should learn to improve their practice through a variety of field experiences. In 1950, Mead (2001) also iterated that teachers should know how to equip children with the capacity of making "new inventions for a new world" (p. 61) by teaching them the skills of how to think and solve problems.

Context is fundamental to both qualitative and design-based research paradigms (Hoadley, 2004; Merriam, 2009). Since the research is not being conducted in order to produce replicable results, it can be utilized to make a significant and sustainable change within a particular learning environment. In these methodologies, researchers investigate the actions and experiences of their participants as they occur within their specific setting (Bogdan & Biklen, 2007). Joseph (2004) expressed three intertwined goals for design-based research projects – research, design, and pedagogical practice. As an innovation is introduced within a learning environment, both design qualities and prior research knowledge are utilized to improve that innovation. Furthermore, by implementing the traditions of qualitative research, the stories of the participants can be told (Bogdan & Biklen, 2007).

Defining Characteristics

Design-based research includes several characteristics (Collective, T.D.-B.R., 2003). It merges the goals of the learning environment with theories of learning. Then it utilizes continuing cycles of design, enactment, analysis, and redesign, and through this process it strives to develop and explain implications for practice as well as design improvements. Design-based research explores the ways that a design functions and the interactions that occur in the classroom; additionally, it documents and connects the outcomes of the interactions with the design.

Qualitative researchers strive to understand the meanings that people have constructed from their experiences, and they are more concerned with the processes involved in making meanings rather than in the outcomes (Merriam, 2009). To develop this understanding, the researcher spends extended time in the natural setting of the participants in order to comprehend a particular phenomenon from their unique perspective. Consequently, the researcher is the primary instrument for collecting and analyzing data. During analysis, researchers utilize thick, rich description to describe the context, the participants, and their activities. Finally, the choices that qualitative researchers make in their investigations are purposeful. They want to learn the personal stories of their participants in order to develop understandings and provide meaningful explanations.

Building Theory

In addition to the implementation of an innovation within a specific context, design-based researchers might also investigate other questions related to the culture, social dynamics, and collaborative structure of the users within that environment (Joseph, 2004). Barab & Squire (2004) described design-based research as drawing from multiple theoretical frameworks and

forms of research to understand the nature of learning. As researchers explore cognition in context, their exploration may include developing technological tools, curriculum, and theories to understand and support learning.

Merriam (2009) explained that a purpose of qualitative research can be to illuminate theory through an inductive process. Rather than building theory through the strategic implementation of a particular innovation, as in design-based research, qualitative researchers gather data that can be used to build theories. This data may occur in the form of information from interviews, field notes, recorded observations, or documents and artifacts. They are then analyzed inductively to derive findings "in the form of themes, categories, typologies, concepts, and tentative hypotheses" (p. 16). This data can also build theories about particular practices.

The researcher in a design-based research investigation collects data throughout the study to improve the design of the innovation in an approach called progressive refinement (Collins et al., 2004) because it involves putting the first version of a design into the environment to see how it is going to work, and then consistently revising the design based on experiences with it until it works effectively. By employing qualitative tradition and methodology, the researcher understands data by using multiple sources, thick description, systematic analysis, and consensus-building around interpretations (Collective, T.D.-B.R., 2003).

In planning for a design experiment, the researcher investigates learning theories and ideas that are pertinent to the study (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003). Then the environment is studied in order to understand what type of design is needed to improve learning, how it can work to improve the learning process, and to define goals for an ending point. A preliminary design is then developed to initiate the cycle of research. The researcher has to develop an initial design, conduct the experiment, and carry out the eventual analysis.

A Holistic Perspective

The connection of social context with personal experience denotes the perspective of qualitative research as holistic (Bogdan & Biklen, 2007). This perspective helps to explain the situational nature of qualitative research. As individuals interact with the world around them, they construct new meanings that help to shape their reality, and for qualitative researchers to ascertain how people understand and make sense of their experiences, they must develop insights by seeing the world from the eyes of their participants.

Cobb et al. (2003) described the settings, including variations in type and scope, where design experiments can be conducted. Among these variations, are two that deal with the classroom learning environment. A one-on-one design-based research experiment is when a research team conducts a series of teaching sessions with a small number of students to create a small-scale learning environment to study the implementation of an innovation in-depth. In classroom experiments, a research team collaborates with a teacher (who might be a research team member) to assume responsibility for instruction.

Design-based research assumes that cognition is a process that involves the learner, the learning environment, and the learning activity; therefore, these elements must be studied together. This designed research provides several benefits (Barab & Squire, 2004). First, since the research results came from a social context, they are more likely to influence instructional practices. In addition, products and programs are developed that may be utilized in other places. Also, because the results have been explored through the consequences of use, they help to provide some evidence of their trustworthiness and possible transferability. Consequently, since researchers are directly involved in the study through the design of the curriculum and theory, they are accountable for the ultimate consequences of their research.

Design-Based Research in the Learning Environment

In his meta-analysis of online learning environments, Winn (2002) iterated that educational technology research has often been disconnected from practice. With the use of design-based research, the teachers and students are able to participate in the development of the tool to suit their learning needs and to collaborate with the researcher in improving its effectiveness. An online learning environment can also be the setting for a design-based research experiment about the complexity of learning within that context (Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004). Learning takes place, in part, through the social interactions of the members of the virtual learning environment and can be distributed among its members. Winn (2002) explained that most of his research was conducted through design-based experiments, and in this research, a learning tool was built and then used with the students. The data that resulted from the implementation of the innovation was used to guide revisions to the tool itself, and it benefitted the research to understand how the learning process was affected by the tool and interactions with the tool. This type of experiment encouraged the research and development to happen simultaneously.

A design-based research experiment may focus on improving a particular practice rather than on a concrete innovation. One example was the model of instruction called Fostering a Community of Learners (FCL) developed by Brown and Campione in 1992 (Collins et al., 2004). The FCL approach extended the learning community horizontally across a classroom and also vertically across grades. The focus of FCL classrooms was on the subject areas of biology and ecology, and students completed these tasks: researching topics, sharing what they had learned, and participating in some consequential task. The development of this learning approach was accomplished through design-based research in a series of phases. Throughout its

development, FCL led to a better understanding of some principles of learning. Among these principles were self-regulation, discourse distributed expertise, and communities of practice.

In a study by Hakkarainen (2009), design-based research was utilized to investigate the two different innovations - the use of educational digital video and problem-based learning. The students involved in this study designed and produced educational digital videos for the teachers to be used as course material, so the research also involved a new model of educational video production. The project incorporated the following constructivist approaches to instruction within the design: collaboration, creative-thinking, problem-solving, and information literacy skills.

The project also emphasized student-centeredness, small-group work, and self-directed learning as its core characteristics. The students were presented with the following problem: How does one produce a digital video that supports the teacher in his or her everyday work and is available to everyone? The resulting qualitative data indicated that the students felt that the digital video production process supported the individual aspects of learning. Problem-based learning supported meaningful learning as it was defined and implemented in the research. In addition to supporting the learning strategy of problem-based learning, the project also developed the use of digital video as an effective method of instruction (Hakkarainen, 2009).

Qualitative Research in the Learning Environment

At the University of Chicago in the 1920s and 1930s a group of sociological researchers came to be known as *The Chicago School* (Bogdan & Biklen, 2007), and they practiced the beginnings of qualitative research as they relied on firsthand data gathering. They recognized that meaning arose from social interaction, and understood the human dimension in their research. Likewise, in 1932, the sociologist Willard Waller observed the social world of the

school and believed that children and teachers were "tied in a maze of social interconnections" (Bogdan & Biklen, 2007, p. 11). The interconnections and interactions that occurred during online collaboration were key elements of the research questions of this investigation and warranted further study of methods within qualitative research.

During the 1960s, educational researchers began utilizing qualitative research to understand why schooling was not working for all children (Bogdan & Biklen, 2007). These researchers investigated the views of those students whose voices had not been heard; those individuals who felt underrepresented. By exploring the needs of all students within the context of the classroom, the qualitative researchers began telling the stories and experiences of those who had been marginalized by society. This story-telling capacity of qualitative research was also utilized to relate the experiences of the individuals involved in this study.

Changes in society over time led to differing ideological strands of qualitative research (Bogdan & Biklen, 2007). For this exploratory investigation, it was necessary to borrow strategies from different traditions of qualitative research as the students participated with various features of the LMS. One of these traditions, *postmodernism*, questions the integrity of progress due to the rise of global problems. Postmodernism has influenced qualitative research to investigate *discourse analysis* as a means of "understanding relationships, activities, and meanings that emerge through language" (p. 22). In this manner, discourse analysis is a method for understanding social interactions, and it can be used in classrooms and in online learning environments to explore how students construct meaning from language in social experiences.

The theoretical orientations of qualitative researchers are organized according to how they view the world and how it works (Bogdan & Biklen, 2007). Researchers need to understand their theoretical beliefs and use them to help collect and analyze data. Most qualitative

researchers adopt a phenomenological perspective; in other words, they attempt to understand the meaning that individuals assign to the events and interactions that they experience within particular situations. Reality is socially constructed as people interpret their interactions with others, and their perceptions are fundamental to that reality.

Symbolic interactionism is another theoretical orientation of qualitative research that has an influence on learning environments (Bogdan & Biklen, 2007). Within this orientation, people confer meaning on other people, events, or objects; however, these items have no meaning on their own. As people interact with others, they construct meaning, and when they are together within a particular situation, they can develop shared perspectives. Meanings, however, have to be negotiated, and researchers then can investigate how these meanings develop. Therefore, norms and practices for working together are collectively developed by the individuals within a group.

To relate the experiences of individuals within a particular culture, qualitative researchers often employ ethnographic methods (Bogdan & Biklen, 2007). In ethnography, researchers may collect data through participant observation, interviews, and questionnaires. The purpose of these methods within ethnography is to honor participants' voices while simultaneously providing accurate representations and interpretations of cultural phenomena to outsiders (Bogdan & Biklen, 2007).

By borrowing from the above traditions of qualitative research, I was able to incorporate these methods into a comprehensive understanding of how the participants in this study were able to learn together and work toward establishing an online community of practice. Although I primarily aligned myself to the tradition of ethnography to investigate the online community in an LMS, it was also necessary to analyze discourse; explore the social construction of shared

meanings; and observe how norms and practices for interaction developed. A challenge in this particular investigation was to utilize these methods within the intentional design of an online community or culture rather than on one that was already established.

Controversies Regarding Design-Based and Qualitative Research

Both design-based and qualitative research studies are often critically examined to observe whether or not the claims made from these types of studies are warranted (Bogdan & Biklen, 2007; Shavelson, Phillips, & Feuer, 2003). Practitioners of design-based and qualitative research studies believe they are making evidence-based contributions to the field of education about learning environments; however, federal policy has moved in another direction of "scientifically-based" research. The U.S. Department of Education has supported research that investigates cause-and-effect methods and randomized experiments; whereas, design-based research focuses on the contextualized use of materials and innovations that may or may not have generalized uses beyond that particular learning environment. Furthermore, qualitative research also focuses on individuals within the natural setting of a particular context, and findings cannot always be attributable to other situations.

Hoadley (2004) noted that rigor is one of the most used words applied to research, and design-based research is sometimes criticized for not having the necessary amount of scientific rigor to be considered academic research. In an effort to design a methodology that is sufficiently rigorous, quantitative researchers attempt to produce experiments that can be replicated and described in numerical detail. In addition, their experiments utilize random assignment and controls to provide more reliability. Hoadley (2004) explained that this type of scientific experiment makes sense in other fields, such as medicine, to reduce the influence of interpretation by a researcher. In education, however, this type of experiment may not be

reasonable because a teacher would probably know what treatment is being administered, and it is impossible to accurately set up all teaching and learning experiences to be equivalent.

Bogdan & Biklen (2007) noted that qualitative researchers attempt to interact with participants within the context of their environment while also trying to blend into that environment. As a result, qualitative researchers are often accused of bias because of this intense interaction; therefore, they have to be reflective and conscious of their impact on the environment without trying to completely eliminate it. Being open to learning from interaction within the environment can assist qualitative researchers as their thinking is informed by the data. By having a thorough knowledge of the setting, qualitative researchers are also more likely to be able to ascertain their possible effects on the participants.

Hoadley (2004) contended that in reality, all forms of design-based research fall somewhere in a continuum from strict experimental methods to design-based ones, or they may contain a combination of methodologies. There are many possible outcomes from design-based research that are all derived from the "interaction between designed innovations, human psychology, personal history or experience, and local contexts" (Hoadley, 2004, p. 204). Ideally, the ultimate outcome is the particular innovation that is being introduced, designed, and developed within the study.

In response to concerns about whether or not qualitative research can be scientific, Bogdan & Biklen (2007) contend that scientists and mathematicians who are creative leaders in their field have a more exploratory understanding of science than how the term "scientific" is applied to research. That term typically means that something is being measured numerically. Breakthroughs in science, they noted, are often made by people who are unwilling to be constrained by any particular methodology.

Design-based research cannot focus on the narrow measures that are usually used in other forms of research (Collins et al., 2004). The innovations that are used in conjunction with the design can cause many changes within the learning environment. Design-based research is described as formative because it is used to refine educational designs or innovations as they are being used – progressive refinement. However, design-based research is not aimed solely at refining practices or innovations; like qualitative research, it addresses theoretical questions and issues in order to develop some deeper understandings that may be applicable in other settings.

Some forms of research use fixed procedures to test hypotheses (Collins et al., 2004). Design-based research, however, reviews many different aspects of the design in trying to describe that design in practice. The end result is often unknown, and the design may be radically different at the end of the experiment than it was at the beginning. In addition, the interactions of the participants employing the design within the context of the learning environment are essential to the design-based research process. As in ethnographic research, rich descriptions are used to understand what is happening and why it is happening within this particular context (Collins et al., 2004).

Strengths and Limitations of Design-Based and Qualitative Research

Both design-based research and qualitative research take place in natural contexts and result in the production of theories on learning and teaching (Barab & Squire, 2004; Merriam 2009). According to Barab & Squire (2004), a strength of design-based research is that the participants are actively involved in the study through the design and even the eventual analysis of the results. The purpose of the research is to develop a theory that characterizes the design in

practice as opposed to simply testing hypotheses. The biggest challenge of design-based research is to describe the entire process of the design in a way that others find valuable.

The qualitative researcher is also involved in interacting with the participants in order to construct meanings from their shared experiences (Merriam, 2009). Qualitative research is naturalistic and examines the phenomenon within the local context, and the purpose of the research is to uncover meaning and to develop interpretations. Qualitative researchers are not interested in attempting to make predictions; rather, they want to observe and explore what unfolds within the story of the research experience.

The most important facet of both design-based research and qualitative research is the impact that the study can have on the local context where the study took place (Barab & Squire, 2004; Merriam, 2009). In design-based research, once an innovation is developed and observed in a particular setting, it may be futile to disseminate it to other learning environments outside of the original context (Bell, 2004). Likewise, the phenomenon that is investigated through qualitative research will have its greatest meaning in the context in which it occurred (Barab & Squire, 2004; Merriam, 2009). Although, the resulting theories that may evolve from these studies may hold some truths that can be applied in other contexts, researchers or practitioners are cautioned about generalizing the results of a study to different contexts where they are not directly involved.

Inquiry within Design-Based and Qualitative Research

Traditional research experiments involve controlling variables and focusing on cause and effect, but design-based research experiments differ from traditional research methods because they attempt to incorporate experiments into real life settings in order to find out what works in

practice (Shavelson et al., 2003). This means that the variables cannot be controlled. Design-based research involves developing a comprehensive record of the entire process that may include video recordings, periodic interviews, questionnaires, and textual artifacts. This documentation allows for reflection during analysis as to what happened during the course of the study, and this analysis generally leads to a lengthy narrative of the processes involved throughout the study. The challenge for the research is to arrive at rigorous and grounded conclusions that can help to ensure that they can be replicated in other situations.

There are different traditions of inquiry in qualitative research (Grbich, 2007), and the one that is most similar to design-based research is the iterative approach. In that approach, a series of actions of data collection are regularly repeated until nothing new is likely to emerge. As in design-based research, the researcher collects data in the real life environment or context and uses a critically reflective process to understand the phenomenon. This process is cyclically repeated until the research question is answered. With the collaboration of the participants, the researcher constructs meaning of the experiences and after data are collected, conducts thematic.

Design-based research studies involve an emphasis on the narrative report of the interactions and eventual feedback that can blur the roles of researchers, teachers, and instructional designers (Bannan-Ritland, 2003). This blurring of roles can generate questions about how such a research study should be organized. Bannan-Ritland (2003) proposed a focus on the following three stages: the development of research questions, data collection and methods, and the design of artifacts, processes, and analyses.

Qualitative researchers attempt to enter into the field with an open mind about what they will encounter (Bogdan & Biklen, 2007). Through direct examination, they learn about the setting, subjects, and other sources of data, and their plans begin to evolve. They do not go into

the study with a predetermined hypothesis; the needs of the study scaffold the design of the research. Design decisions are made throughout the study, and the analysis is ongoing during the investigation.

The Innovation in Design-Based Research

Design-based research experiments are necessary in order to determine how novel innovations perform under different conditions and in different contexts (Collins et al., 2004). Early design-based researchers argued that it was also essential to investigate how the learning environment affects the variables involved in teaching and learning. Because no design can specify all of the details required for its implementation, the researcher must make constant decisions to know how to proceed at every level. Therefore, designs in education can never be completely specified, and the interactions of the participants in the learning environment can cause changes in the design.

The traditions of qualitative research can illuminate the meanings that are attributed to the design of innovations. By utilizing the constant comparative method of data analysis (Bogdan & Biklen, 2007), for example, the design-based researcher can begin analysis early in the study and is almost finished with analysis by the end of the study. By constantly reviewing each iteration of the design and noting how the participants interacted with each other and the innovation, the design-based researcher is better equipped to make informed modifications to the design.

The innovation itself is an important determinant of the success of its implementation (Zhao et al., 2002). Teachers who have control over an innovation within their classrooms and do not need to depend on outside personnel are more likely to implement it successfully. If the

innovation fits within the school culture and dynamics and if it fits within existing practices, it also has a higher success rate of implementation. In addition, for successful integration, the needed technological resources have to be readily available. One resource may be in the form of the researcher who is capable of providing support and modifications to the innovation, as necessary.

The Research Methodologies within Learning Management Systems

Utilizing the guidelines for design-based research proposed by Bannan-Ritland, (2003), may prove to be advantageous for studying the implementation of a learning management system in the elementary grades. Bannan-Ritland (2003) described an integrative learning design (ILD) framework to provide a flexible model for design-based research. The framework portrays design-based research as a socially constructed process that is heavily invested in the particular context in which an innovation is being utilized. By using such a framework, there is some consistency in methodology that can further the impact of design-based research across a variety of settings. The integrative learning design framework defines broad phases of the research as follows: informed exploration, enactment, evaluation-local impact, and evaluation-broader impact (Bannan-Ritland, 2003). In this manner, the research design of this framework uses the constant comparative method because with each phase of the design of the innovation, data are collected and analyzed (Bogdan & Biklen, 2007).

Using this design, the online learning environment can be developed according to academic standards with the collaboration of the researcher, classroom teacher, and the students within the phase of informed exploration (Bannan-Ritland, 2003). In the first phase of informed exploration, the goal is to define potential outcomes of an innovation. This begins by conducting a needs analysis and understanding the current culture existing within the learning environment.

The teacher and students are then able to enact the use of the LMS within the classroom as the main method for delivering and participating in instruction. The researcher may need to provide technical assistance and training, as necessary, to facilitate implementation within this enactment phase. In the Enactment Phase of the ILD framework, the innovation is viewed as something that is systematically articulated and then revised over a number of cycles. First the innovation is introduced and explained to the users. After the initial use, it is revised as needed and sent back to the users again. This cycle is repeated while the innovation is consistently refined and improved (Bannan-Ritland, 2003).

Evaluation of the innovation involves two phases (Bannan-Ritland, 2003). In the first phase, the goal is to understand how the designed innovation met the needs of the local stakeholders (students, teachers, parents, etc.). In this phase, data analysis and interpretation begin with an investigation into local impact. Evaluation of local impact is conducted to determine how the innovation of the LMS is being used within the culture of the learning environment of the classroom. This analysis may lead back to the enactment phase if the researchers and participants deem that the innovation needs additional fine-tuning. Collectively, the teacher, students, and research may propose and make design modifications to the innovation and begin the cycle of enactment again. Finally, upon a predetermined date or when no other modifications to the innovation can be conceived, the second phase of evaluation, the broader impact of the innovation is analyzed. This analysis may lead to eventual publication of the results of the data, but practitioners are warned about generalizing the contextualized outcomes of the study to different environments. The participants evaluate the broader impact of the elements of an online learning environment within the LMS to explore whether it can be utilized

or attempted in other contexts, such as other classrooms in the school or district; however, these questions may only be able to be answered through other research (Bannan-Ritland, 2003).

This methodology is useful for exploring the use of a learning management system in the elementary grades. First, it proposes to develop possible learning theories about collaboration an interaction from the introduction and practice of the innovation (Collective, T. D.-B. R., 2003). The LMS is an innovation that can cause potential change to the activities within an elementary classroom. It can shift the locus of control from being centered primarily on the teacher to include the students in the class (Black et al., 2007). The students, teacher, and researcher have to work collaboratively to develop content to be housed within the LMS. As in qualitative research, these collaborations can cause students to make new meanings of their collective information (Merriam, 2009).

Eventual changes may need to be made to the design of the online learning community within the LMS, and the researcher would need to play an integral role in making those modifications as well as in providing professional training in the pedagogical changes that could occur as the teacher begins to utilize the LMS (Joseph, 2004). A cycle of evaluation, design improvements, and classroom use needs to become a function of this design-based research experiment throughout the progression of the study (Collins et al., 2004). Upon completion of the study, the researcher, teacher, and students can determine if the LMS encouraged the use of constructivist pedagogy within an communities of practice (Bannan-Ritland, 2003).

Overview of this Investigation

To answer the research questions, it was necessary for me to conduct an in-depth investigation into the design of an online learning community and its eventual use by a teacher

and students within an LMS to encourage collaboration and interaction. Whenever I referred to the teacher and students involved in this study, I substituted their real names with pseudonyms to ensure confidentiality.

Although design-based research can utilize either qualitative or quantitative methods, I decided that the descriptive data provided by qualitative research was the most effective means to provide the rich details required by this exploratory design-based research experiment. According to Merriam (2009), qualitative research would enable me to understand how the participants interpreted their experiences, constructed the learning community, and attributed meaning to their experiences within that environment. The purpose of collecting this data was to determine if particular features within the design of the online learning community contributed to the collaborative efforts of the students, and if they were eventually able to interact effectively as members of a learning community.

In this design-based research experiment, the purpose for designing an online learning community was to encourage student interaction, communication, investigation, and reflection in a unit of study on Native American tribes. In this study it proved to be practical to design the online learning community as a folder within the teacher's course in the LMS that contained all of the activities, discussions, and projects that the students completed during the unit. During the investigation, the environment continued to evolve throughout its implementation and utilization because the classroom teacher and her students were still relatively new to online learning, and the environment had to continue to be modified as new opportunities for interaction and collaboration were introduced.

The Setting.

In this study, the classroom teacher, Ms. Johnson, and her students in this fourth grade classroom attended a school that was located close to the metropolitan area of Atlanta, Georgia. The school district offered a variety of technology resources in each of its schools, and within each classroom, students had access to an interactive whiteboard, four desktop computers, and many peripheral devices such as scanners and digital cameras. In each school, student laptop computers were available for checkout, and students were also encouraged to bring their own wireless, computing devices to school for completing assignments. This initiative, however, had yet to become the norm in every classroom, and students did not utilize their own technology devices in most schools.

Approximately three years ago, the school system purchased a subscription to ANGEL Learning System. ANGEL is an acronym n for A New Global Environment for Learning. It is an LMS that provides technology tools for various forms of social networking within the safety of a secure online course. Although the perceived users of this LMS were to be mainly secondary students and faculty members, there was increased interest in the use of the LMS in elementary classrooms. The use of the LMS could enable the teachers and students to work with each other collaboratively within learning communities. Through an LMS, teachers can organize units of inquiry and map them to standards; then they can also create learning games, communicate with students, and develop assessments related to those units. Students can communicate with each other, complete assignments collaboratively and individually, and post their work within the system.

Before the study, Ms. Johnson was mainly utilizing the LMS as a repository of shared information and reading materials for the students. The students generally accessed this information from home to review lessons that were taught in the classroom that day. Ms. Johnson also posted assessments with multiple choice questions for the students to complete in order to practice for standardized tests. Also, before the onset of this study, the students did not use any communication tools within the LMS, such as discussion forums or email, as the school had decided to turn off those permissions for students. As I began the design of the online learning community within the LMS, I restored the ability for students to use the tools for online communication.

In addition to supplementing the use of the four student desktop computers housed in the classroom with ancillary school laptop computers, Ms. Johnson and I encouraged the students to bring their personal computing devices to school to facilitate access to the LMS. There were occasions when every student was using some type of technology device, but sometimes they worked in pairs or in small groups with one device for the entire group, and they took turns using it, as necessary. The students then completed most of their instructional activities each day by participating in the online learning community within the LMS.

Selection of Participants.

All 27 fourth grade students in this classroom at an elementary school in a relatively rural area of a county in Georgia and their classroom teacher participated in this study on the design of an online learning community within an LMS to encourage student interaction and collaboration. In this group, 16 students were female, and 11 students were male. There were 2 Asian American students, 7 Latin American students, 1 multi-racial student, and 17 European American students. Regarding instructional assistance, 4 students received special services for

English to Speakers of Other Languages (ESOL); 12 students were in the Instructional Support Team (IST) process meaning that they were receiving additional accommodations in the area of reading; 8 students were receiving Early Intervention (EIP) services targeted for the area of mathematics. Finally, approximately half of the students in the classroom were receiving assistance from the free or reduced lunch program.

This classroom was selected for several reasons. First, as a convenience sample, the school was located in reasonably close proximity to the location of my office, and as the researcher in this design-based research study, I had to be available to provide assistance to the teacher and students within the classroom. Second, the principal of the elementary school and the classroom teacher were supportive of technological and instructional innovations and were flexible in allowing the classroom to utilize an online learning community.

The Design Process.

I designed and implemented the online learning community over a period of five weeks. Before the onset of the study, one week was spent assessing the needs of the classroom for online learning by planning with Ms. Johnson, observing the classroom, determining the specific technical infrastructure, and ascertaining the perceptions of the students. I began the initial design of the online learning community, by obtaining input from students via individual open-ended surveys and focus group interviews about how they preferred to use technology and how they perceived that technology could be used to generate interaction with their peers. Then I completed the initial design by uploading the planned online activities for the first week of its implementation. Following this design phase, Ms. Johnson began to utilize the environment with her students, and I made field notes of my observations of their online work and practices.

Toward the end of the week, I had all of the students complete an open-ended survey about their perceptions and use of the online learning community, and based on their responses, I selected four or five students to participate in a follow up focus group interview.

Throughout the study, I shared all of the resulting information with Ms. Johnson and considered her perceptions about her students' online interaction and collaboration. Finally, I used all of this qualitative data to influence the design of possible modifications to the online learning community. I repeated this weekly process with the participants five times during the course of the study, and I made field notes to document my observations of the changes of the practices of the teacher and the students with each step in the progression of the design. During each of the subsequent five weeks of the study, the online learning community continued to develop, and I incorporated the collaborative input of the participants and the results from their interactions into future design modifications.

Students were prompted to participate in discussion forums and online activities to support classroom instruction. The discussion forums were focused on developing interaction and communication among the students. Throughout the study, the types of discussions and projects were modified and evolved to fit the particular needs of the students within the context of this particular learning community. As new opportunities for learning experiences arose, additional changes were made to the online learning community to accommodate those teachable moments.

Students were arranged into cooperative learning groups to facilitate collaboration on projects within the LMS. The teacher and I selected an encompassing unit of study that was aligned to the Georgia Performance Standards (GPS) for fourth grade, and the online lessons we planned also integrated the language arts standards for reading and written communication for

fourth grade. This unit of study incorporated the learning standards on Native American tribes and explorers. We also considered the technology standards for students, Nets for Students, from the International Society for Technology in Education (ISTE), while we developed the activities for the online learning community.

Within their groups, each student participated in online learning activities and assignments including multimedia lessons and links to simulations. The teacher and I then provided the students with questions to answer about what they had learned in order to promote additional online research. These questions were posed to promote inquiry and the synthesis of original thinking not just for locating factual information. Students also participated in individual online reading assignments regarding the learning standards. After completing these activities, the students answered questions that were designed to augment reflection and then posted their reflections in a discussion forum. The teacher eventually required the students to read posts from their peers and to post additional questions, which, in turn, the students of the original posts answered in reply.

Both individually and in groups, the students determined additional areas of study related to Native American tribes or explorers that required further online exploration. They generated these decisions through their interests and experiences and chose how they would pursue their investigations. They wrote reflections about what they had learned and submitted it to discussion forums. The students then read each other's posts, made responses, and asked clarifying questions. The teacher and I planned these procedures to assist the students in developing an understanding of the various aspects of the selected learning standards. While the students worked on developing this expertise, they also planned a cumulative group project on a particular Native American tribe or an explorer that they had studied. Using the input of the

students, we developed choices about the types of collaborative projects they would complete, and these activities were designed to encourage the students to synthesize information in new ways while interacting with each other.

Within their groups, the students collaborated on wikis that they designed to embody their new understandings about their Native American tribe or their explorer. In these wikis, the students summarized and described various aspects of their topics instead of just relating facts about those topics. We then required each group of students to use the information in their wiki to write a collaborative story blog about a day in the life of a member of the Native American tribe or explorer they had researched. This activity was designed to cause the students to make meaningful connections to the factual information in their wiki. From this blog, the students then designed a multimedia project, or digital story, that required them to collaborate as a group to construct information in another new way.

At the beginning of the last week of the study, the students published their digital stories in the online learning community and presented these projects to the other students in the classroom. Again, we required the students to participate in a discussion forum about the presentations and projects and posed additional thought-provoking questions. Furthermore, they posted written feedback within the online learning community so that the students could learn additional ways that they could improve their work on future assignments.

Finally, at the end of the last week of the study, all of the students collaboratively designed a whole class summative project that incorporated information that they had previously learned in their individual and small group research and assignments. For the final assignment, they developed an online tribe to represent their online learning community that encompassed

the content they had been investigating. We utilized synchronous live chat with the students to determine the scope and sequence of this project as well as to encourage the participation of every student. We developed the tribe within the online learning community and collectively celebrated its completion on the last day of the study.

Phases of Design Implementation

The innovation that I designed through the collaboration of the participants in this study was the online learning community developed within the learning management system (LMS) that the teacher and students were utilizing in their fourth grade classroom. Bannan-Ritland (2003) proposed a cyclical integrative learning design (ILD) framework that I used as a model to guide me in planning the research and analyzing the resulting data in this study. However, I adapted this model to meet the needs of the participants within this context since the online learning community kept evolving throughout its implementation.

Before the introduction of the online learning community, I initially met with the classroom teacher to determine the unit of study for the design and to discuss the specific needs of the school community, the teacher, and the students involved in this study. We also investigated the methods available within the LMS for facilitating student collaboration and interaction. I then conducted an online open-ended student survey within the LMS to determine what features the students perceived were needed within their online learning community. From the responses of the online open-ended survey, I selected students to participate in a focus group interview to further illuminate their responses and to assist in the initial design of the online learning community.

I integrated the above information with the following considerations: (1) principles of learning from constructivism; (2) strategies for stewarding online communities of practice; (3)

the methodology of design-based research, and then I aligned this content with the research questions for this investigation. Next, I designed goals and activities for the first weekly phase of the online learning community. I then organized and reviewed this phase of the online learning community with the teacher to explore its various features and to determine if any changes needed to be made to the design before implementation.

After this initial design of the online learning community, the students, the teacher, and I implemented the first phase of the online learning community over a period of one week. We then continued this process for a total of five weekly phases to develop the overall design of the online learning community within the LMS.

Elements of the Weekly Phases of the Design

Particular elements were incorporated into each weekly phase to provide a framework for the design of that phase and assist its implementation within the online learning community. The following elements were identified and utilized each week throughout the investigation: (1) design issues being addressed; (2) overview of the design; (3) desired goals/outcomes; (4) results of implementation; and (5) reflection and projected modifications.

Design Issues Being Addressed.

Each week was centrally focused upon particular design issues and themes that emerged while the participants were utilizing the online learning community during the previous weeks. These issues were strategically considered to help answer the research questions of the investigation; therefore, they emphasized the development of interaction and collaboration of the students within the online learning community. The design issues were also aligned to research to support constructivist learning principles and the development of an online community of

practice. Connections were then made within this element to the specific reasons for the new modifications or additions to the online learning community.

Overview of the Design.

Throughout the investigation, the overview of the design detailed the strategies that were used to address the salient concepts for the week. Furthermore, this overview described any additional folders, documents, links, or activities that were uploaded, created, or modified within the online learning community as well as justification for their inclusion.

Desired Goals/Outcomes.

For the design issues that emerged for each weekly phase, I identified particular goals and corresponding outcomes that I hoped the participants would achieve during that week. Depending on the issue, I usually developed indicators to help me determine whether or not the participants had achieved those goals. Since this research was exploratory, I sometimes did not know specifically what those indicators would be until the participants actually began interacting and collaborating with each other. They often did not meet these goals in the manner or at the time that I expected; sometimes these goals were achieved in a later phase of the design based on the needs of the participants or their development within the online learning community.

Results of Implementation.

As the students began working with each new phase of the online learning community, I remained with the class in case any technical, instructional, or design issues arose that required my assistance. Any issues were documented for further design improvements. I noted anecdotal observations of student interaction both in the face-to-face classroom and online in the LMS

while they worked with the online learning community, and I archived online documents and artifacts in the form of discussion posts, reflections, emails, and projects that the students created within the LMS. I met with the classroom teacher to note any additional modifications that needed to be made to the design and then executed those design modifications.

Throughout the study, the teacher participated in informal discussions with me about her observations and perceptions of the students' use of the online learning community. Some key indicators included the following: student online collaboration on projects; examples of interaction by reviewing student questions and explorations; and the quality of student posts and communication in discussion forums. Other specific indicators were developed and determined during each discussion. I utilized this information to design further modifications to the online learning community.

All of the students completed a weekly online open-ended survey (Appendix A) to explore their perceptions of the online learning community and to reflect on their participation within the online community. From these responses and teacher input, I selected four students to participate in a weekly focus group interview with questions that I developed around the themes, characteristics, and practices of online collaborative learning (Appendix B). I maintained documentation of the written online interviews and transcribed recordings of the focus group interviews for further analysis throughout the study. In addition, I used this information to design weekly modifications to the online learning community within the LMS.

Because of the exploratory nature of this study, I could not predetermine all of the issues and themes that would result as the participants interacted and collaborated with each other within the online learning community. The design had to be flexible enough to respond the

participants' interests and concerns; therefore, I often had to make spontaneous design modifications, and recorded them under this results element of the weekly phase. Each week, this element was further segmented into appropriate sections that were organized according to desired goals, particular strategies, resulting data, emerging themes, or unexpected issues.

Reflection and Projected Modifications.

I used the constant comparative method of data analysis to note recurring categories or themes in the data that were collected through the implementation of online learning community during each weekly phase of the design and reflected on this information to decide how to begin designing the next phase. I had to determine how the participants interacted, collaborated, and benefited during that week, and to develop logical next steps to initiate, develop, or maintain a particular strategy for the following phase. Within this element, I also provided a reflection on the data to illustrate how I perceived that the research questions were being answered within that phase, and some key indicators included evidence of student interaction, the quality of student discussions, and examples of collaboration to determine community participation and involvement. I determined further indicators during the course of the study and upon the study's conclusion and shared these findings in Chapters 4 and 5 of this dissertation.

Data Collection Methods

During the course of this investigation, I collected qualitative data through open-ended surveys, focus-group interviews, observations, and artifact analysis. In detail, these methods involved (a) administering online open-ended student surveys; (b) leading focus group interviews; (c) conducting classroom and online observations; (d) reviewing teacher and student artifacts of work. This data helped to inform ongoing modifications to the online learning

community, and upon final review and analysis, they led to my findings related to the development of a virtual community of practice within the elementary grades.

Open-Ended Surveys.

Another crucial method for data collection in this study was the online open-ended survey that each student completed weekly within the LMS. Through the online open-ended surveys, all of the students were equally provided an opportunity to voice their perceptions about the design of the online learning community and their individual and collaborative practices within it, and they were able to craft reflective responses to the questions I posed. I posted the online survey at the beginning of the week within the online learning community, and the classroom teacher had the students complete the survey in class. Each survey typically consisted of 5 or 6 open-ended questions (Appendix A) that the students answered however they deemed appropriate. Toward the end of each week, I reviewed the responses to determine which students I should include in the weekly focus group interview in order to delve into their online responses for further analysis and clarification. I also utilized their responses to establish additional modifications to the online learning community as the students were always asked how they thought the online learning community could be improved. The open-ended surveys also provided me with on-going data that I was able to analyze upon the conclusion of the study to determine any particular consistencies, patterns, or changes to their responses.

Focus Group Interviews.

The above online open-ended surveys allowed me to collect a greater volume of responses, but a limitation of those surveys is that neither I nor the participants were able to ascertain other forms of communication, such as body language or spoken inflection while the questions were being asked or the answers were being given (Merriam, 2009). To compensate

for this shortcoming, I followed the open-ended survey with a weekly focus group interview. I selected the focus group interview as an integral method for data collection in this investigation because how the students related their experiences as they participated within the online learning community was indispensable to my overall understanding of their online collaboration. Furthermore, the data I obtained during the focus group interview was socially constructed by the students as they interacted with each other (Merriam, 2009), and this approach closely aligned to the conceptual framework guiding the study.

I began each session with purposefully crafted questions (Appendix B) to initiate discussion about various aspects of the students' work within the online learning community, and then I followed up their responses with additional questions to probe for further insights about concepts or connections that were being developed during the interview. This information was used to note recurring opinions, experiences, and suggestions about the online learning community and to guide ensuing modifications to its design. I always ended the interviews with asking the students if they had any specific requests for particular tasks to be included within the online learning community. The teacher and I collaboratively selected students to participate in these focus group interviews based on their activities, communications, and interactions in the face-to-face classroom as well as within the LMS. To ascertain a variety of perspectives within these interviews, we selected different students each week, and we usually included two boys and two girls in each interview.

Observations.

Due to the design of this research, I found it necessary to conduct two different forms of observations – face-to-face and online. During my observations, I assumed the role of collaborative partner, as described by Merriam (2009). In this role, I was a complete participant

in the activities of the classroom, while the participants were also aware of my role as an observer. This participatory role was instrumental to this design-based research because as the researcher within this methodology, according to Barab & Squire (2004), I had to provide technical support and instructional scaffolding during the implementation of the innovation.

I observed the students in their face-to-face classroom as they worked independently or collaboratively on the assignments and activities involved in this study. I participated in these face-to-face sessions with the students and their teacher for at least two days each week, and each session lasted approximately three hours. While the students were working, I made field notes of their discussions, behaviors, and interactions. These interactions included how they related to each other, to their teacher, to me, and to the technology tools, including the online learning community. I also recorded a memo immediately following each observation for on-going and future analysis.

I also conducted daily online observations as a collaborative partner within the online learning community. During these observations, I would note how the all of the participants interacted with each other online via the tools of communication available including discussion forums, chats, and emails. Some of these observations occurred while the students were actively working within the online learning community in synchronous sessions, and other observations happened asynchronously as the students participated at different times on the same activities. I also noted their participation in the online assignments that the teacher and I provided for the students within the online learning community. I included these observations within my recorded memos and reviewed them throughout the study; the resulting field notes were essential data to making informed design modifications and analysis.

These observations assisted me in making additional modifications to the design of the online learning community both during and after the face-to-face and online sessions. For example, sometimes it was obvious that I needed to make an immediate change to the directions within the online learning community as the students struggled to complete an activity. Furthermore, the teacher and students sometimes made spontaneous requests for new activities or discussions, and I had to make that addition in order to facilitate the instruction that was occurring. I also documented these spontaneous modifications within the transcriptions of my recorded field notes, and I describe many of these events in detail in Chapter 4 of this study.

I observed how the online learning community was being used by the students in the LMS, and I interviewed students both online and in face-to-face focus groups about their perceptions regarding the use of the online learning community. I documented these observations with field notes that I made both during and immediately after each session. Some key indicators for these observations, related to a community of practice, included the following: student interaction, collaboration, and motivation. I also reviewed the quality of the artifacts, reflections, and communication that were created by the students in their individual and group practices, and I noted these artifacts to ascertain the depth of interaction, evidence of socially constructed understandings, and uses of communication.

Documents and Artifacts.

Reviewing the specific discussion posts and projects that the students completed within the online learning community gave me some insight into their experiences with online learning. Some of the documents that the students completed were collaborative and illustrated the input of the various students in the group, while others were individual and evidenced personal perceptions of the work that the students were completing. In a sense, the artifacts provided a

trail of the culture (Merriam, 2009) that the students developed within the online learning community. The discussion posts, emails, wikis, blogs, and stories afforded me the perspective of the students as they interacted with others online. As the students completed these assignments, I reviewed these documents to decide how to proceed with additional modifications or activities within the online learning community in order to encourage more interaction and collaboration.

I substantiated student collaboration as they pursued the advice of peers in the form of questioning to obtain clarification of the content and assignments or as they offered suggestions to peers for improving their work within the online learning community. I noted student collaboration on projects as I observed their documents that included contributions from several students in an effort to enhance and complete a project. I determined student interaction with the teacher as they participated in questioning, explaining, and discussing content and assignments and as they utilized the online tools that were necessary to initiate that interaction (discussion forums, blog posts, or email). I confirmed interaction among students by reviewing their various online discussions and noting their involvement in completing learning assignments and projects. Finally, I verified the interaction of the students with the content as I monitored their engagement in exploring the concepts presented in the online learning community on their own time or through other methods than those included within the online learning community. When students chose to complete additional activities other than those required by the teacher, then they were also illustrating additional interest in interacting with the content.

Issues of Transferability and Trustworthiness

The transferability of this study was bound to the context of the learning environment of the classroom involved in this research according to the central premise of design-based research

(Barab & Squire, 2004). However, it was significant to determine how effective an online learning community can be within an LMS to promote student interaction and collaboration in an elementary classroom because of the importance and growth of online learning within this school's district. An assumption of qualitative research is that there is no one determinant of the phenomenon being investigated (Merriam, 2009). The interpretation of the data relies on the skills of the researcher to collect and analyze that data with a perspective that on one hand can be critical yet also understanding of context in which that data were acquired.

According to Conrad & Serlin (2011) maintaining rigor in data collection and analysis enhances trustworthiness in qualitative research. I strove for trustworthiness in my findings through the following procedures: participating in prolonged engagement in the classroom with the participants; triangulating multiple sources of data; and providing opportunities for member checking for accuracy. Furthermore, by writing thick, rich descriptions to contextualize the study, I attempted to provide transferability within this qualitative study so that it could possibly help to develop the theory of socially constructed knowledge through interaction and collaboration within online communities of practice in other elementary settings. These endeavors could possibly lead to some transferability to other online learning communities; however, the primary goal was to explore the design within this particular context. In recognition of this specific focus on the particular learning environment, Conrad & Serlin (2011) noted that transferability is less important to qualitative research than trustworthiness. To ensure this trustworthiness, I employed the following techniques:

1. **Triangulation of Data.** I utilized open-ended surveys, focus group interviews, observations, field notes, and artifact analysis as various forms of data in order to triangulate that data. This triangulation provided me with enough samples to

investigate patterns and recurring themes. The different data enabled me to support the conclusions that I determined upon reflection and analysis.

2. **Multiple Session Interviews.** By conducting weekly focus group interviews with different students, I was able to develop support for recurring concepts among the disparate groups of students. This strategy reduced the threat to the accuracy of the participants' responses and ensured trustworthiness for the ensuing conclusions developed during the interviews. Likewise, the weekly online open-ended surveys enabled me to confirm the soundness of the individual student reflections to the questions as I was able to note consistencies or disparities among their responses.
3. **Member Checking.** I invited the classroom teacher to review the transcripts of interviews, reflections, field notes, and final narratives that appeared in the final research report, and I also invited the students to review the transcripts of focus group interviews in which they participated. This measure was undertaken to ensure that the data I had collected and analyzed represented their intentions and actions accurately. This also ensured that the data I collected represented their ideas accurately.
4. **Thick Description.** I provided detailed descriptions of the observations I conducted in order to detail the context of the learning environment. These descriptions constituted a significant aspect of the data analysis in this research.

Data Analysis

I transcribed the field notes and interview transcripts that I collected throughout the investigation and then uploaded all of the data and maintained them within Atlas-ti software. Other forms of data included observations, recordings of focus group interviews, written online

open-ended surveys and emails, artifacts of student-created projects, saved online discussion forums, and procedural notes made during the design stages of the study. With the use of the software, I was able to scroll through the various forms of data and note additional comments about particular aspects of that data (Merriam, 2009).

Since each weekly phase called for analysis of the resulting data in order to plan for the next phase of the design, I used a constant comparative method of data analysis to construct meaning of the phenomenon of online learning within this context. According to Bogdan & Biklen (2007), in this approach, I collected data throughout the investigation and looked for recurring issues that eventually became categories. After I noted many instances of these data, I reviewed all of the different information related to the categories. I next considered the basic social processes and relationships that were revealed as I continued to categorize the data, and then as my analysis became more focused on particular categories, I began coding and writing. It is important to note that this process in not linear, and my analysis kept leading to additional data collection and coding. Since I implemented a design-based research methodology in this study, I had to make modifications, as necessary, and sometimes immediately, to the online learning community. These modifications were noted, and as additional data were collected and analyzed, I refocused my data collection based on my emerging findings.

In addition to informing the design of modifications to the online learning community, my analysis also assisted me in developing some conclusions and further questions about the research. I utilized this data to provide recommendations for designing and sustaining future online learning communities within this context. My data analysis included factors that provided evidence of online collaboration, interaction, and benefits for the research participants. As Merriam (2009) noted, “Data analysis is the process used to answer your research questions” (p.

176). However, other factors were determined during the course of this particular study and were only pertinent to the specific characteristics of the context of this learning environment.

At the completion of the study, I read through all of the data that I had collected and began to group and sort specific details from that data into broader concepts. I used this process to facilitate analysis and then further coded my notes and observations in order to determine major themes and consistencies. This system of coding developed as patterns began to emerge from the data, and I represented those patterns with terms and phrases (Bogdan & Biklen, 2007). These categories were responsive to the purposes of the research but also open to new ideas that resulted from the experiences of the participants (Merriam, 2009). This strategy of categorizing the data into codes helped me to achieve a more viable understanding of the role and development of student collaboration and interaction via online learning in the elementary classroom as well as to interpret new discoveries in this exploratory study.

Ethical Concerns

Before collecting data to investigate the research questions, I obtained Institutional Review Board (IRB) approval from Kennesaw State University and written permission from local school district leaders. Furthermore, I obtained signed consent of the parents of the students (Appendix C), as well as informed assent of the students (Appendix D). All of the students provided informed assent, and they were free to withdraw from the study at any time. I informed the students that participating in the study had no impact on their grades. In addition, the classroom teacher signed her consent (see Appendix E) for her participation.

As I conducted focus group interviews in a conference room of the school, I used the actual names of the students during the interviews; however, I changed their names during

transcription. I invited all of the students to check the transcriptions of their interviews to document that their intentions were related accurately. I utilized a digital recorder to record those interviews, transcribed each interview, and saved the recordings and transcriptions on the hard drive of a computer. At the successful conclusion of the dissertation, I deleted all recordings from the digital recorder and from the computer's hard drive.

As the teacher participated in the planning sessions and discussions about the progress of the unit, I utilized a combination of hand-written notes, audio recordings, and emails to document these events. If we used the actual names of students during our discussions or while reviewing their work or survey responses, I changed their names to pseudonyms when I transcribed the notes or when I analyzed the work. The teacher was invited to check all of this information for authenticity and accuracy, and I destroyed any confidential information upon the successful completion of the defense of the dissertation.

Presentation of Results

I conducted this research study as a culmination of my doctoral program and organized all of the resulting information into my dissertation to satisfy the requirements of my EdD in Leadership for Learning with a concentration in Instructional Technology. Currently, I work within the district office of a public school system in the Department of Instructional Technology. In addition to my completed dissertation, I included the results of this study within a document for the school and district in this study to inform current and potential practices of online learning in the elementary grades. The research revealed specific strategies for fostering collaboration and interaction within an online learning community, and these strategies could be disseminated to online educators to improve instruction.

In future chapters of this study, I include a detailed analysis of the data and my interpretations to add to a deeper understanding of the learning theories involved with online student collaboration and interaction in the elementary grades. I accompany the data with a narrative relating how the strategies of planning, designing, implementing, and modifying the online learning community continually cycled throughout the course of the study. I also provide anecdotal information to assist in explaining the themes that led to the eventual design modifications and how those changes to the design encouraged or impeded online interaction. The story of how this research study unfolded within the elementary classroom may prove to be useful to elementary teachers and researchers as they attempt to explain the phenomenon of online learning.

Summary

Real-world situations are complex and often resist experimental controls; large amounts of data arise from the analysis; and it is necessary to use a variety of research designs (Collins et al., 2004). Design-based research goes beyond just designing and testing particular innovations Collective, T. D.-B. R., (2003). It tries to understand the relationships among theory, designed artifacts, and practice. In this way, ideas about teaching and learning, technology tools, and pedagogy can be observed while they influence each other to produce particular interactions. As in qualitative research, this can possibly lead to more holistic changes to educational practice because it involves looking at the big picture of a particular phenomenon (Collective, T. D.-B. R., 2003; Bogdan & Biklen, 2007).

The strength of the methodology of this study is in the intertwining of two robust research paradigms that focus on how participants construct meaning within the context of the

online learning community. Design-based research leads to on-going improvements during the period of the investigation (Collective, T. D.-B. R., 2003). In this study, participants interacted and collaborated within the online learning community, and I analyzed the data that resulted from this interaction with the constant comparative method from qualitative research. Furthermore, I utilized the themes that emerged from the analysis to assist me in refining the design of the online learning community according to the framework of design-based research. However, design-based research views the nature of learning as a complex system that goes beyond the introduction of the innovation by itself (Collective, T. D.-B. R., 2003); rather, an innovation is successful when it is aligned to the needs of the context in which it is being used.

CHAPTER IV

ANALYSIS OF THE DATA

In this research study, I utilized a design-based research methodology in an attempt to answer the following three original research questions: (1) What features and characteristics of an online learning community within an LMS encouraged collaboration in a fourth grade classroom? (2) How did interaction among students with each other, their teacher, and the content occur and develop within an online learning community? (3) How did participating in an online learning community enhance learning for the fourth grade students involved in this study? To answer these questions, I employed the approach of progressive refinement suggested by Collins et al. (2004). This approach describes the process of introducing an initial version of a design of an innovation within the learning environment. Then the researcher can determine its effectiveness in achieving the desired goals. Finally, successive modifications and revisions are made to the design until it works satisfactorily.

I continually viewed the design of the online learning community through the lens of how individuals interact in a virtual community of practice. Wenger et al. (2009) noted that although online communities can develop naturally as learners discover shared interests and begin to communicate with each other about those concepts, they can also be purposefully stewarded and nurtured in order to facilitate the community's development and growth. Bernard et al. (2009) defined interaction as the learner's engagement in an online course with the content, other learners, and the instructor to increase understanding. Abrami et al. (2011) agreed with this

definition and posited that interaction can be strategically designed in order to develop skills in self-regulation, multimedia learning, motivation, and collaboration, and then proposed design principles for encouraging interaction for developing those skills. Understanding how the students were collaboratively constructing meaning through their interactions in this online learning community assisted me in understanding the themes that emerged from the data.

Furthermore, this lens of learning through collaboration and interaction within a virtual community of practice also helped to inform additional modifications to the design of the online learning community throughout the study. Wenger et al. (2009) enumerated strategies for cultivating online communities of practice and noted that an essential role of a steward of such a community is to "attend both to what happens spontaneously and what can happen purposefully" (p. 24). Although I used design principles to encourage interaction, it was necessary to attend to how the online community developed spontaneously through various forms of interaction and to respond to their immediate needs and requests in order to promote a sense of community.

To initiate the design of the online learning community, it was essential to understand the context of the online learning environment in which the students would be interacting. This section begins with a description of the online learning community that the students, teacher, and I, as the researcher, designed within the structure of the LMS based on our preliminary planning. A narrative then follows of the five weeks of the online learning community that evolved as it was collaboratively modified and developed with the teacher and student participants throughout the study. Interwoven throughout this chapter are data I collected during the study to illustrate the processes involved in the design, implementation, and subsequent modifications of the online learning community. In this way, the data support the themes that were generated by my analysis.

Throughout this narrative, I have substituted the name of the school district, school, classroom teacher, and students with general terms or replaced them with pseudonyms to protect the confidentiality of the institutions and individuals involved in the study. In addition, I made some minor editing to student responses and discussion posts to provide clarity, but I left most of the spelling and capitalization errors that students made within their online writing.

The Context of the Online Learning Environment

Deciding how to organize the online learning environment was an obvious first step in beginning this investigation. I originally envisioned that there would be several learning modules developed within the course of this study, but the typical view of a learning module developed as a specific portion of a unit was not effective within this particular context. Namely, the online learning community kept evolving and building upon previous student work and through discussions within the LMS as the participants and I made collaborative decisions about how the online learning community could be refined to better suit their needs. For example, there were some instances in which activities and discussion forums were organized and developed one week, but the students worked on them later in the investigation. This delay was because the students were not ready to participate on particular assignments until they acquired more skills for interacting within the online learning community.

The teacher had been using the LMS, ANGEL Learning System, with her students but only as a resource repository in which students would review materials prior to assessment. I wanted to differentiate the collaborative work in this study from the rest of the content within the LMS so that we could house our community-building endeavors in a new environment. Wenger et al. (2009) referred to this environment of an online learning community as a *digital habitat.* Consequently, the planning and instruction occurred in phases within one folder of the teacher's

online course within ANGEL Learning System, and that folder gradually came to be referred to as the *Online Learning Community* at one stage of the design. For the sake of clarity, I will refer to the environment that we developed during this study as the Online Learning Community (OLC) throughout this discussion.

An Overview of the Learning Management System

To enter the OLC, the students had to first log into the ANGEL Learning System, and then they arrived at a *Home* screen that included a dashboard with sections or nuggets of tools and information. They usually then selected their teacher's course from the list of courses in which they had been enrolled. In this case, the students selected the course, *Grade 04 – Ms. Johnson's Course* (Figure 1).

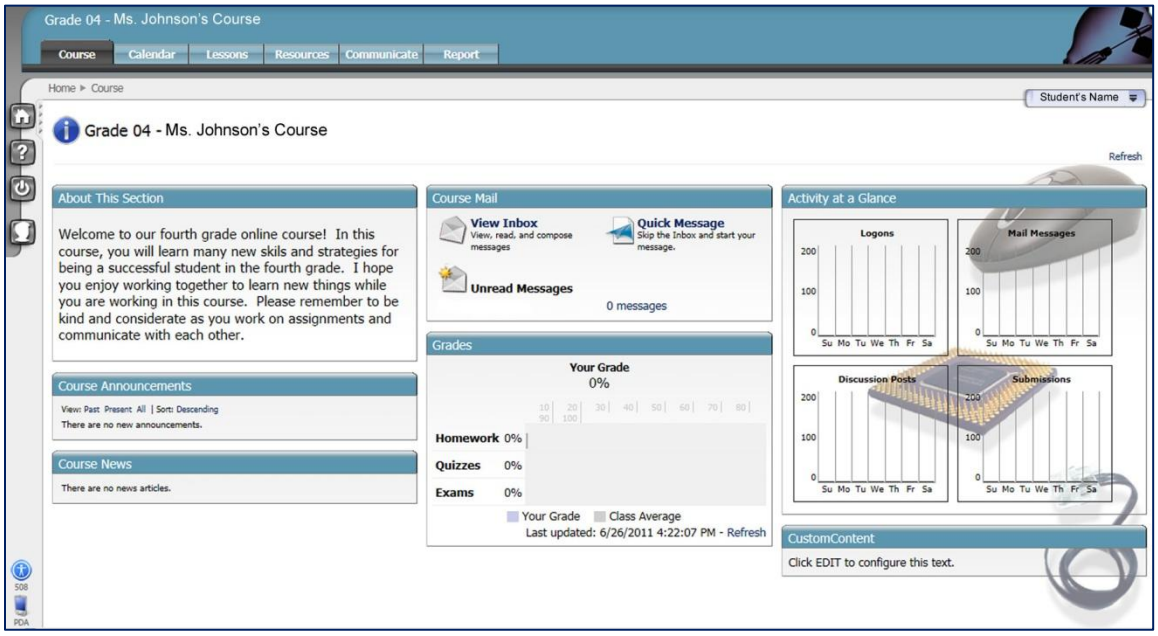

Figure 1. The Course Home Screen

After the students opened the home screen of the course and reviewed the information available on that screen, they could select the *Lessons* tab to access the OLC. When the students

selected the icon labeled *Online Learning Community*, it showed the additional content and activities that continued to develop each week throughout this study. The resulting OLC after the final week is illustrated in Figure 2.

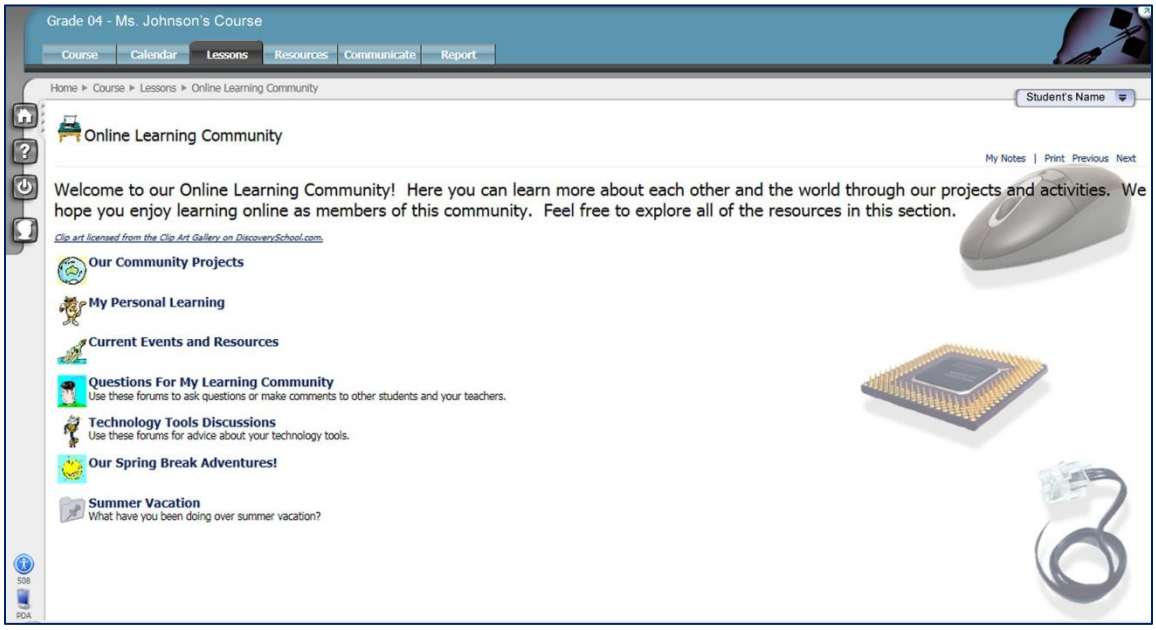

Figure 2. The Online Learning Community

Preliminary Planning of the Online Learning Community

In the initial planning for the design of a learning environment that encouraged the development of a virtual community of practice within the fourth grade classroom, it was necessary to ascertain the needs of the teacher, Ms. Johnson, and her students for learning online. I began planning the design by meeting with Ms. Johnson to decide which strategies should be taught during this instructional unit, and I developed an online open-ended survey for the students to complete independently to determine any particular activities that they thought should also be included in the OLC. I then followed this open-ended survey with a face-to-face classroom observation to ascertain how the students were currently interacting with each other.

Collaborative Planning with the Classroom Teacher

I met with Ms. Johnson approximately a week before beginning this investigation to discuss the learning standards the students needed to study in the last five weeks of school. Ms. Johnson stated that she felt like she had not been able to go in-depth in the unit on Native American tribes or explorers. Both of these elements were located within the social studies standards for fourth grade in the State of Georgia (Appendix G). Although she had taught these standards earlier in the year, she felt like she needed additional time to complete projects and activities in these areas.

She anticipated that the working online would be difficult for the students because they were so unaccustomed to interacting and collaborating to this extent. Furthermore, Ms. Johnson related that her class had several students in it who required additional assistance for disabilities in reading and written language as well as English language learners who received support from the teacher of English for Speakers of Other Languages (ESOL). After we chose a particular focus of instruction, the students would research that subject matter using a variety of technology devices. Then when they had learned new information about the topic, they would share what they had learned with others.

Ms. Johnson explained that she had recently assigned group projects to the students that required them to research ecosystems and to work with a partner to develop a presentation on a particular ecosystem. This assignment would need to be completed during the first week of the study. She had taken the time to probe for higher-level thinking by having the students develop questions to guide their research.

Ms. Johnson felt frustrated by the time she had to spend on preparing for standardized testing since she wanted to study concepts in more depth than the time allotted to particular aspects of the content. She felt that it made her rush through subject material just to cover it for

the testing. Furthermore, she described specific needs of many of the students that she felt warranted additional time and attention in order to achieve a thorough understanding of the content:

> My kids have higher needs. My ESOL kids, for example, have to draw on something in order to develop an understanding, and I also believe in doing projects to learn. Our schedule is to have three hours on Friday to do science and social studies, and that's it. So, the other teachers said that we had to teach the Westward Expansion in two weeks. That gave us three hours one week and three hours the next, and they think that they can do that. I can't do that. I can't teach them about the Gold Rush and everything else in three hours.

At the end of this planning session, we decided to orient the students to the OLC for the first week of the investigation as they finished their Ecosystem unit and continue to use it as they learned about Native American tribes and explorers (Appendix F) for the remaining four weeks. We would have the students research these areas in order to promote more student interaction, and we would have them collaborate with their peers through online discussion forums, projects, and communication. We had not finalized all of our plans at this point in the design of the OLC, but this helped us to narrow our focus its content as well as some strategies for its implementation.

Reviewing the Online Student Open-Ended Survey

During this phase of preliminary planning, the students responded to six open-ended questions in an online open-ended survey that was delivered via the LMS. These questions were designed to establish their current perceptions of interaction and collaboration within an online learning environment. Furthermore, the survey attempted to determine their expectations about

working within the OLC and to help devise activities that could be designed to improve their collaboration within in an online learning environment. All of the questions posed in the open-ended surveys are included in Appendix A, and samples of student responses to the particular questions are organized in the following section to highlight their existing perceptions.

The first question asked what types of activities students can do online to learn more about a topic, and most students noted that they could conduct research online. Most of the students envisioned that their online work meant that they would use a variety of sites to locate new information about topics, but they did not describe how those topics would be chosen. Whenever they discussed specific content, they noted that Ms. Johnson would supply them with links to websites or activities to practice skills and content that would be necessary for research and assessments. The students' responses demonstrated that they understood that the Internet was useful for finding new information. As Nadia commented, "We can read books online about the topic or research the topic to get lots more information."

Still other students viewed online activity as a way to practice new skills. This practice could occur as they played online educational games aligned to learning standards. According to Denise, "They could go on ANGEL to Practice or if you are learning something new in math go to IXL to practice on or to do math if you don't get something."

Samantha responded, "Students can do informational games to practice on for the CRCT, and they can stay focused by doing their own work. When they look like they are playing games, they are really trying to figure out the question to what the teacher asked them to figure out." This response illustrated that she was trying to convince outside observers (possibly teachers, parents, administrators) that playing games is a legitimate way of learning and could

even help students perform better, through practice, for the standardized test (CRCT) and for helping them to stay focused while they were working independently.

Tommy was the only student who explained that they could learn online by completing projects or presentations. "We can do photostorys or powerpoints to do some of our lerning," he commented.

Kristy was the only student to describe interacting with others as a way of learning via online communication. As she noted, "They could read on Pearson and then chat with other students on ANGEL so they could also learn new information."

Finally, Rebecca was the only student to describe making choices to individualize or personalize the way she learned online. "You can lern the way you want to not the way other people want to," she said.

The next three questions required the students to reflect on how they could interact and collaborate with other students online. In response to the second question, *How can students work together online?*, most of the students explained that they could communicate with each other online. Their online work together focused on four purposes: (1) to share information, (2) to help each other with assignments, (3) to help each other with technical concerns, and (4) to develop projects through research.

Specifically, they mentioned the following possible methods for communicating with other students online: text messaging, email (through the LMS), video chat, Facetime (video chat via the iPod touch), Pictochat (communicating with text and illustrations via the Nintendo DS and Nintendo DSi). I included the specific ways that the students described how they could communicate because those descriptions demonstrated their previous experiences with their

personal technology devices as well as with the LMS. Furthermore, other than email, which can be asynchronous, most of the other forms of communication that the students listed were synchronous.

However, some of the students realized that there were some differences in asynchronous and synchronous forms of communication as they listed both forms within their responses. As Tonia responded, "We can use instant messaging and email."

Denise was concerned about the content of the communication. "They could email to work together but you can't send other people mean things if they didn't do anything or send innobrobreate [inappropriate] things to other students." This concern about online etiquette, or *netiquette,* became more prevalent among other students later in the study, and we addressed it within the design as its need became more distributed.

As they commented on working together on assignments, some students described how they were able to learn together. "They can ask each other questions about things they forgot," Simone observed. "That way they will remember."

The students also noted that they could collaborate on projects as they worked together, and Eva noted that as they collaborated on research, they would divide up their responsibilities. "By having a student do one thing and the other could do another thing," she explained. "Like one student could search facts and another could find out what it's like there or where it lives." This was a reference to their collaborative research on ecosystems.

The third question asked students to describe what it means to be part of a group when they are working together. Students responded that they were able to work as a team to share responsibilities, help each other, learn together, and communicate. The most important concern

to the majority of the students was that everyone had responsibilities and so each student had to complete an equal share of the work.

According to Tommy, working in a group means, “We all need to do the work, and not make just one person do the work.”

In addition, Eva explained, “Everyone has to work together and get involved. If that doesn’t happen the group might fall appart.”

Some student responses indicated a developing understanding of how working collaboratively led to the social construction of knowledge. Samantha pointed out, “Working in a group means helping someone else learn, and they both use each other’s learning to make all of the knowledge to know all the answers on a test.”

The students also referred to the role of communication in group work. Kristy said that working together in a group means, “That we all work together and express our answers and ideas.”

One student, Mallory, often had difficulty working with other students, and Ms. Johnson had moved her desk away from the other students in the face-to-face classroom because of her consistent conflicts. Her answer to this question was, “It means you can't leave enyone out of your group.” I reflected on how to encourage the participation of all of the students within the OLC so that they all felt included.

The students had to explain whether they were more of a leader, a follower, or both when working with a group to answer the fourth question. Although this question could easily result in quantitative information, I was more interested in their explanations and how they considered

themselves and the qualities related those particular roles. The majority of the students viewed themselves as having to assume both the roles of a leader or a follower when they worked with a group and this sometimes resulted from the work that needed to be done as well as from their personal preferences.

Samantha's answer showed that having to assume both roles was due to having to learn from each other. "I think both," she said, "because I know some things that no one else will know and some people will know things I wont know."

Nadia said that she could be a leader and a follower, yet the responsibilities she described for herself in a group sounded like she was mainly following as she never explained how she was guiding other members of her group. "I'm both because sometimes I do the work and sometimes I write what people say to write." Nadia was one of the native Spanish-speaking students in the ESOL program, and I wondered if she had difficulty with this question because of the language skills involved in understanding and answering it or due to cultural differences related to this topic. Two other students gave answers to this question that I could not decipher, and they were both Latin American students in the ESOL program.

Luis answered, "It is real good."

Marcos said, "They can be giving anseres."

At this point, in the investigation, I was unsure of how to analyze their responses, but I realized that I would have to consider language and possibly cultural differences as the students interacted with each other in the OLC.

Several students saw themselves as strong leaders. As Robbie stated, “I consider myself to be a leader because I'm a great leader. I know how to lead and command mostly.”

Candi also noted particular qualities that made her a good leader, “I consider myself a leader in a group because I am hard working and vocal,” she responded.

The students who saw themselves as followers only listed that they preferred to follow with the exception of Mallory who stated, “I’m usually a follower or maybe neither because no one likes me to be in thier group. Do you think you could talk to them about that?” Again, I remembered that she had problems working with other students, and I also realized that she was using the open-ended survey to interact with me, as the researcher, to help resolve this issue.

The fifth question focused on how the teacher interacted with the students to help them as they worked online. The students’ answers on this open-ended question were essentially evenly distributed among the following five categories: (1) give assignments, (2) provide technical help (3) provide content help, (4) explain directions, and (5) communicate via email. Candi noted that the assignments the teacher gave extended beyond school. “She can assign you work online to work on at school or at home,” she stated.

In the final question, the students were asked to describe the work and qualities of an ideal online classroom, and they responded with the following descriptive features: collaboration, communication, fun, multimedia, paperless, projects, technology, and student choice. The students expected that their online classroom would be engaging, and some of the students provided thorough descriptions of this online environment:

Eva had high expectations for the amount of choices and engagement that online learning would provide for her:

> It would be awsome. I tell you awsome. If you need help with something you click on the teacher and then tipe your answer in. Then you click a volume to speak in next you click ok. If you want to raise your hand click on yourself and there will be actions you can do. If your doing a test click on it and you can start. To get your lunch click on your tray then get the food and drink you want. At reccess click on things and you can do games. At PE muisc or art you can also do little mini games there too.

Aaron recommended collaboration within his ideal online learning environment. "It should be like a bunch of people working on their technology," he stated.

Jackson also described the importance of others in online learning. "An online classroom should be like a group based set of people working and communicating together to find good educational sites," he explained.

Communication was also important to Katie. As she described, "Alot of technology is around and people are searching for information or face chatting with other people."

Elise saw communication as something that she could be allowed to do after she had finished her assignment, instead of it actually being the assignment. "I think that the [online classroom] should be like a regular classroom," described Elise. "I would do work and when I finish, I could chat with my friends."

Videos would help Simone learn in her online classroom. "It should be like being in a regular classroom," she explained, "except with videos teaching you how to do it. That way you can learn how to do it. Instead of geussing the answer, you can go on the computer and click on the button that you need to and press play on the video or whatever it is and it will teach you how to do it." In addition to the media of video, this option provided her with more self-direction as she determined where she needed more help in order to understand the content.

Finally, Samantha, noted, "An online classroom should look the same as a regular classroom. However the way you learn does not matter as long as you are learning what you should be learning." She was the only student who focused more on the content and standards rather than on the process involved in her learning.

Planning for Access to the Online Learning Environment

In order to have the students begin working so extensively online, they needed to have more online access to be able to work within the ANGEL LMS. Consequently, to increase student access to the online course, we encouraged the students to bring their own wireless computing devices to school because within the last year, the district had been implementing an initiative termed Bring Your Own Technology (BYOT). In addition to the students' personal devices and the four student desktop computers in the classroom, Ms. Johnson and I decided to reserve a cart of student laptops for as many days as possible for the rest of the school year.

Observing the Face-to-Face Classroom

Before designing the OLC, I also completed a classroom observation to determine additional needs of the students in online learning. Ms. Johnson had organized the students into pairs and assigned them an ecosystem to research on the Internet. Each pair of students was using a school's laptop computer and locating important information about their ecosystems to use in a PowerPoint presentation. I observed the students working together in the classroom, and I noted that they were having some difficulties in communicating their ideas about the research, content, and procedures for completing their projects to their partners. Some students struggled with collaborating on their research, as they had alluded in their online survey when they mentioned that they felt someone always did more work than others during group work.

Jason had been assigned to work with Mallory, and they were using the laptop to search for information about life in the arctic. They were using a search engine, netTrekker, to find sites related to animals of the arctic, and Jason entered *arctic animals* to begin his search. From the choices available, he selected *Arctic Animals Home* from http://library.thinkquest.org/3500/. On this site, there were additional links to pages about different animals that lived within the Arctic ecosystem. On each animal's page, characteristics and physical features of the particular animal were included as well as questions and answers of specific information about that animal.

Jason selected the link labeled *Arctic Fox*, and he began reading the information written on that page. He told Mallory to copy the notes for their PowerPoint presentation. Mallory did not want to write notes on the information and told Jason that it was her turn to use the laptop to find "the facts" because she would like to research a different animal. Jason did not want to give up the laptop to Mallory, so he ignored her, took out a sheet of paper, and began listing all of the information about the Arctic Fox that was provided on the website. Essentially, he was writing down everything that was available about the Arctic Fox instead of summarizing the important details that were necessary to present to the other students.

After a few minutes of watching Jason copy down notes, Mallory tugged on the laptop and said, "Jason, it's my turn." Jason ignored her, however, and continued writing on his sheet of paper.

Mallory then turned to Ms. Johnson for help. "Jason is copying down all of the information and won't let me do any of the research," she complained.

"I'm just finishing my information about the Arctic Fox, and then I'm going to let her do it." Jason answered.

Ms. Johnson told Mallory to let Jason finish writing down his information and then she could research the next animal. Mallory sat down and folded her arms and waited until Jason was done so that she could begin her research. When he was finished, she took the laptop and began researching, but they were glaring at each other during this process.

I noted that although they were both looking up information online, they were not really collaborating with each other or interacting in a manner that produced an outcome that helped them to learn how to work together or to learn new information effectively. Furthermore, while they were conducting their research, they were listing facts about their ecosystems for their presentations rather than making connections to their work or sharing information in new ways. They were competing with each other for access to the resources and not deciding together what information was important, helping each other find the content, and assisting each other in making appropriate notes.

Some other students were having problems similar to Jason and Mallory, and other students were socializing and having conversations about topics other than about the research. Elise was working with Mindy, and they were having a discussion about their upcoming Spring Break vacation rather than about their ecosystem. On the other hand, Janie was working with Miguel, and she was doing all of the research and note-taking while he appeared to be content to watch her while she was working. I recalled that Ms. Johnson had stated that some of the students in ESOL would stand back and let other students do all of the work on their group assignments.

I noted that while the students were developing their presentations in PowerPoint they were simply copying information onto each slide. I asked Janie how they would present the

information, and she said that they would just read their facts to the other students. I thought that because of the interaction and communication that would be necessary within the OLC, the students had to learn how to reflect on new concepts and share their ideas in motivating new ways. This may help them learn more about how to collaborate with each other and to make meanings from their interaction with each other and with the content.

Reflecting on the Preliminary Planning Data

From the data I collected during preliminary planning, I began developing some conclusions about the types of activities and practices within the learning environment that was currently in place within this face-to-face classroom. To clarify this information, I have summarized my notes in the following list:

1. Ms. Johnson stated that she wanted to explore topics in-depth, and she related that because of the needs of her students, she should spend more time on subject material. However, because of the pressure of standardized testing, she had to cover material quickly, and she also mainly had the students working online to practice skills for this testing.
2. The students were aware of types of online tools for communication, but some of these tools were not features of the LMS, such as video chat, and they were not knowledgeable about the tools that were available within the LMS other than email.
3. Ms. Johnson and the students wanted opportunities to have the students collaborate with each other on projects, and these projects could help the students learn more interdependence as they practiced sharing responsibilities and established different roles for completing this work.

4. The activities that the students completed online were teacher-directed, but some students wanted more opportunities to make choices.
5. To be engaged in their learning, the students wanted to work on the following online activities: interactive games, online research, and multimedia.
6. The students saw their teacher as someone who gave online assignments, provided directions, and gave assistance. All of these roles are aligned to directing and leading, and the students did not describe their teacher as a collaborator, co-learner, or participant in the learning.

Summarizing the Initial Design of the Online Learning Community

Based on the planning session with Ms. Johnson, the results of the online interview with the students, and the observation of activities in the face-to-face classroom, I decided that there were a few items in particular that should eventually be included in the OLC. Primarily, the students needed to have opportunities to collaborate with each other on projects involving research. These projects could assist the students in continuing to develop the skills necessary for effective communication and interaction within a community of practice, and the projects may help the students develop interdependence as they negotiated responsibilities for completing the work.

Before beginning new projects about the teacher-selected standards on Native American tribes and explorers, the students would need to complete their current PowerPoint presentations on ecosystems. To complete the presentations might take another week, and then the students would be out of school for a week due to their approaching Spring Break vacation. I would also have to consider that the work within the OLC would need to accommodate different technology

hardware since many of the students were now going to be bringing their personal devices to school.

Week One: Introduction to Online Resources and Asynchronous Discussions

Overview of the Design

In this first phase of the design experiment, I attempted to assist the students in becoming more self-directed in their learning rather than on them having to rely solely on their teacher for directions. I wanted them to begin seeing the LMS as a place where they could experience more responsibility for sharing resources and having conversations about learning. By planning activities that involved communicating with each other about what they had learned online, the students would also be able to practice with the tools available for communication within the LMS.

During this week, students were completing an assignment on ecosystems that had been planned for them by Ms. Johnson. In pairs, their tasks were to research an ecosystem online and then develop a PowerPoint presentation to share with the other students. The students had requested to have links posted online to sites where they could conduct research. In response, I uploaded links to various sites about ecosystems within the OLC (Figure 3). Providing students with these Web links served three purposes. First, it established a reason for students to go to the LMS. Second, it encouraged the students to view the LMS as a central repository for resources. Finally, it facilitated student interaction with the content and each other as they collaboratively accessed the Web sites and decided what information to include in their presentations.

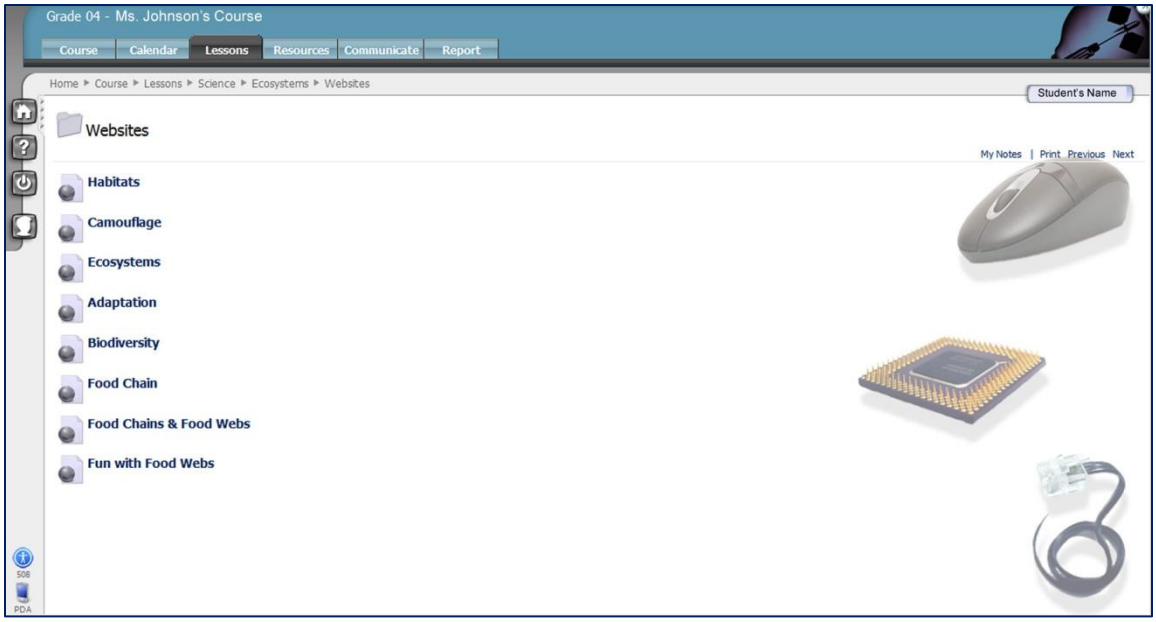

Figure 3. Ecosystems Research Links

To further promote collaboration in this online community of practice, I also developed discussion forums within the OLC with the intended goal of having the students begin communicating with each other about their personal educational interests. Ms. Johnson and I did not require that the students complete these discussions because we wanted to see if they would work on this activity independently. This would enable me to determine if they were becoming more self-directed in their learning. Abrami et al. (2011) noted that providing students with online opportunities to pursue their interests could help students become more motivated. Furthermore, within a community of practice, individuals interact in an ongoing basis to learn more about topics and pursue their passions (Wenger et al., 2002). For me to know how the students chose to work within the OLC was important in planning the rest of this investigation and designing future modifications.

I added a folder within the OLC, labeled it *My Personal Learning*, and organized two discussion forums in that folder. In order to have the students begin participating in the first

discussion forum, I chose to create an open-ended discussion about the topics the students would like to learn more about. I labeled the forum, *What Would You Like to Learn More About?* and included the following directions for the students:

> What would you like to learn more about as we learn together for the rest of the year after Spring Break? Use this discussion forum to write a few sentences describing what you would like to learn. Then we can give you some suggestions and links as we find them in our research. Since you all know each other so well, you may want to suggest some topics to each other!

By designing this forum to be open-ended, I attempted to encourage the students to interact about topics that interested them, and I hoped that it would inform the development of the OLC. It might be difficult for the students to write about a topic with little background information, but they could begin suggesting sites and links to each other. Based on what Ms. Johnson had shared about her students and after observing them in the classroom, I wanted to scaffold the online activities for the students so that they could continue to construct new skills for further online learning experiences. According to Bernard et al. (2009), students construct meanings as they relate content to personal knowledge and apply it to problem solving. To help the students begin, I modeled how to post a link in the forum. Knowing that one student in the class had an interest in fishing, I posted the following:

> Tommy, since you like the topic of fishing, I think you might enjoy the website, Explore the Blue by Discovery Education at http://exploretheblue.discoveryeducation.com/explore.cfm. It has a lot of different

information about fishing and a game called, Thrill of the Catch. In that game, you can even catch virtual fish!

I expected that as the students began conducting online searches, they would encounter content that the other students in their learning community would find relevant and motivating. They would learn about each other's interests by participating in discussion forums, and they could share this information with each other in the OLC. I also speculated about the interaction that would occur between the students and the teacher during the investigation, and what would happen when a particular student's interest was emphasized within the discussion forum.

In the second discussion forum, the students could research their interests and share what they had learned through their inquiry. I labeled this forum, *Where can you find resources about the topics that you would like to learn more about?* An additional purpose for this discussion forum was to motivate the students to begin investigating how to propose new ideas and follow those ideas with possible solutions. Therefore, if the students listed topics they found interesting, they should also develop a plan for finding out more information about those topics. Because all of this would be occurring within a public discussion forum, the other students could learn this strategy by observing the posts of their peers.

Desired Goals/Outcomes

A primary goal for this first week of working within the OLC was to better acquaint the students to this new format, the LMS, for learning as they completed their collaborative research. Since the students had been learning within a traditional face-to-face classroom for several years, they had to learn to use the features of the LMS. As noted by Wenger, White, & Smith (2009), members of an online community of practice employ a variety of technology tools to conduct the

interactive work of learning together. The students' research was further complemented by face-to-face discussion and planning about ecosystems with the available technology tools.

In this online environment, the students would be expected to develop learning strategies, manage their own time, and make decisions about the processes and products involved in inquiry. The students would also need to establish procedures and norms for asynchronous collaboration and communication within the OLC. Because most of this interaction would be occurring asynchronously, this approach could have different implications than the communication that the students had experienced within the typical face-to-face classroom. Therefore, the ideal outcomes of this week were that the students would become more skilled with the LMS by using the research links to resources that I had posted, by sharing additional resources with each other, and by participating in online asynchronous communication in the discussion forums.

Results of Implementation

Observations of Online Research.

The students used the links that Ms. Johnson and I had posted within the OLC to conduct their research on ecosystems. Theses links led to sites of factual information, videos, and interactive games, and the students had to choose the sites that were relevant to the particular ecosystems they were researching. We sometimes had to remind the students that they needed to find information that they could use for their presentations, and eventually, Ms. Johnson insisted that they keep handwritten notes of this information. She resorted to this direction because the students were having difficulty toggling between the different sites, the LMS, and the PowerPoint presentation on their laptops.

To provide additional access to the LMS, the students also used their personal technology tools to conduct research, and the implementation of these tools led to more expertise with the LMS as the students explored its different functions and capabilities. For example, Jackson said that he was having difficulty navigating the LMS with his Nintendo DSI. He noticed that in the lower left-hand corner there was an icon that said "PDA," and he figured out that it must mean "Portable Device Accessory." Independently, he decided to click on it and was able to access everything in ANGEL. This was one of the settings within the LMS that I had planned on showing the students later in our work together. Since they were using handheld devices, they needed to know how to change their display to PDA, which actually stood for *Personal Data Assistant*. This setting enabled users to be able to view all of the items in the LMS more easily when they were using handheld devices. Jackson had already determined this on his own by experimenting within the LMS, and so he constructed his own meaning of the acronym based on his previous experiences.

The students also had to use the links to find pictures of their ecosystems that they could use as backgrounds in their presentations. Since last week's observation, Ms. Johnson had the students summarize information into words and phrases that supported these images. While they worked with their partners, the students had to decide which pictures that they would use from the websites. Two students, for example, debated which animal would better represent the Everglades swamp ecosystem – an alligator or a snake. They eventually agreed on the alligator because they said that it was the animal that most people thought of when they thought about a swamp.

The students continued to utilize these online resources with their partners throughout the week to conduct their research on ecosystems. I observed that they were able to log in, navigate

to the OLC, and begin locating content more quickly as the week progressed, and they also practiced procedures with their partners to facilitate these activities, such as taking turns finding and summarizing facts with their partners and deciding who would be mainly responsible for various characteristics of their ecosystems. Yet, I perceived this work as still an introduction to online collaboration as the students were primarily accessing available information with the links that I had provided for them, and they had not developed to the point where they were discovering their own essential content and contributing it to the benefit of the learning community.

I also noted that they were still copying information from the sites where they researched, and I would have to eventually provide them with opportunities to synthesize content in new ways. I perceived this synthesis as essential to developing new understandings about the subject material. They were also mainly completing this activity from within the face-to-face classroom and were not utilizing the available tools for communication within the LMS to plan strategies, develop content, and share notes with each other from within and beyond the context of the school; although Katie did explain in the feedback section below that she accessed these resources from home.

Focus Group Feedback about Online Research.

In the focus group interview, students commented that they enjoyed this activity of conducting research online because it usually involved collaboration among students, and they were able to talk to each other about what they were learning. Katie described research in this way: “It’s not like it’s pen and paper and your teacher says that you have to be quiet and you

don't talk really about anything. So I like doing it with partners because we're allowed to talk about the thing we're researching."

Samantha explained the process of working collaboratively while conducting online research. "I really do feel like that it is good for us because we can learn how to agree and disagree with good or bad ideas. We also learn about each other and what we like to do and see what they know and what we know. So if we know something they don't then we can help them, and if they know something we don't they can share it with us."

In addition to being able to converse with each other about the websites they were researching, the students also desired collaborative research assignments because they involved designing projects and sharing responsibilities. According to Janie, "One person is drawing or something, and another person's researching online. After that person researches, then the person who's drawing writes it down. So it will take less time."

Simone further described her feelings about her online research. "I feel good working with other classmates. It's fun and when you work together, you can combine what you know. You can also learn more about what the other person knows." This statement explained how she perceived that knowledge is constructed socially when working with others online, and I wanted to help facilitate more of this "combining" of knowledge within the OLC.

When asked about what they think about learning with the use of the LMS, the students said that it made learning easier. Katie said, "I think that's awesome because we can just go home and find ANGEL, and we know where it is. Instead of our teacher just telling us sites that we can go to, she can just put the sites on ANGEL for us, so it's easier." This organizing feature

of the LMS helped that students find the information that was necessary for their online learning activities.

I asked the students how I could make ANGEL better for the students to learn. Luis suggested that I could develop more projects related to social studies or science like the study of countries. Katie again stated, "You could put a folder that every kid in the class would like where they could go and do their own little thing and do what they like." In this way, she was explaining that she was motivated and self-directed and wanted to pursue her own learning interests.

Developing Online Interaction with Personal Technology.

The students' use of their personal technology tools to conduct online research, helped to develop more opportunities for student interaction in the online learning environment. In this class of 26 students, fifteen students had brought in their own devices. There were two laptops, two netbooks, five Nintendo DSi's, two iPhones, four iPod Touches, and one iPad. Two of these 15 students had also brought in more than one device.

A factor that facilitated the use of personal technology devices was the communication occurring among the students. Janie, for example, had become adept at helping the other students with connecting devices to the wireless network. One of the students, Chris, asked for help connecting his device – a Nintendo DSi. He was receiving an error message that there was no network present. Janie told him that he just needed to accept the user agreement; unfortunately, that user agreement was blocked by the school's network.

Chris did not have Wi-Fi access in his house, so I suggested that maybe he could find a business that offered free Wi-Fi for him to connect to the Internet in order to accept the User

Agreement on his DSi. The students entered into this discussion. Tommy suggested that he thought that McDonald's had free Wi-Fi. Tommy had his own netbook but did not have Internet access at home, so he was aware of locations where free wireless networking was available and was willing to share that information with others.

While working with the students, I began discussing more ways that we could develop our online course and the types of online activities that we could initiate after Spring Break. Katie said, "We need a place where we can share out apps with each other for us to use on our own technology." In response to this suggestion, I decided to develop a discussion forum in which the students could recommend applications and share them with each other.

Mindy added, "Sometimes we have questions that we need to ask you about our work online."

"You can always send me an email with your question," I answered. "People usually use emails when they have specific questions that they want answered."

"Sometimes we have the same questions so you will get the same emails," Tommy replied.

I told the students that when you have concerns that many people share, then that was a good time to use a discussion forum online. In fact, so many students had their own ideas about using the Nintendo DSi and the iPod Touch and were verbally recommending ways to use them in the face-to-face classroom that Ms. Johnson also asked me to develop a discussion forum for students to share their suggestions for using their personal devices.

I developed the discussion forums that the students requested within the OLC, and grouped them into a folder titled *Technology Tools Discussions* (Figure 4). Inside this folder, I included two discussion forums. One folder was dedicated to sharing different applications for the iPod Touch, the iPhone, and the iPad – iOS devices. The students could use this forum to discuss the educational uses of applications that they found for those devices.

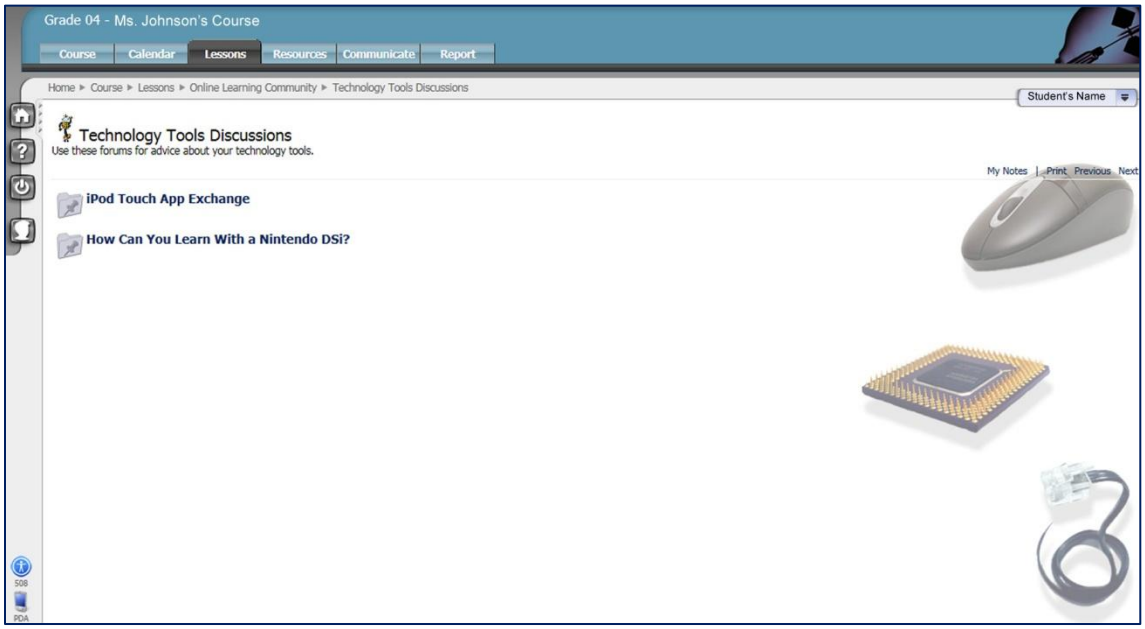

Figure 4. Technology Tools Discussions

I then modeled how to post within one of these forums for the students by writing and submitting the following post within the iPod Touch App Exchange:

Post Title: Whiteboard Lite: Collaborative Drawing

Here is a free app that is really useful in the classroom. With it, two kids can draw together or do their work together on their iTouches.

http://itunes.apple.com/app/whiteboard-lite-collaborative/id301962306?mt=8

In the focus group interview, the students also began discussing the implementation of their personal technology devices to facilitate online learning. The use of their own technology tools helped them to work with each other online on other assignments beyond the school building. For example, Katie explained that she went home and worked with Janie on a homework assignment, and they used the application, Facetime, on their iPod Touches to communicate with each other about that task. With Facetime, they were able to conference with each other with voice and video with the use of their own devices, and they wished that they had more of these opportunities to learn in this manner at school.

Developing Communication in Discussion Forums.

After the students had completed their projects on ecosystems, they could work on the two discussion forums on *My Personal Learning* within the OLC for this week's activities. By the end of the week, only six students had posted within the first forum – *What Would You Like to Learn More About?*, and no students had posted in the second forum – *Where can you find resources about the topics that you would like to learn more about?* Furthermore, none of the students had responded to each other with suggestions of research links to the students' posts in the first discussion forum.

The six students who posted within the first discussion forum listed some particular topics that they would like to learn more about during the study. Most of their responses showed that they had limited experience with working in a discussion forum. Nadia was a student in ESOL, and her discussion post expressed her concern about the upcoming standardized tests that the students would be required to take. In fact, she titled her post, *Things I Need to Practice On,* and her post was as follows:

> I would like to learn more about things that I don't understand. I would like to learn more in math about meidian, mode, and range also of properties. I also need to practice on science and social studies. Because I dont understand it alot. I know some things of it but not all. I want to practice more of this because I want to be ready for the CRCT. That is what I would like to learn about.

At this point in the investigation, it was unclear whether Nadia's concern about testing was due to pressure to succeed from her home or school environment or whether she felt some personal discomfort with her difficulties with speaking English.

Robbie included the most details in his post, but it appeared that he thought that this was an assignment to write a story (Appendix H). He titled his lengthy post *Ancient Animals and Discoveries.* He illustrated in-depth thinking and reflection about his ideas, and his grammar and spelling mistakes showed some experience with texting, i.e. he did not capitalize the pronoun *I*. His post demonstrated his sense of voice in his writing, and it could be exemplary for the other students as they began communicating in the OLC. However, it seemed that he was completing this writing more for himself or for his teacher rather than for initiating conversation with his peers.

After noting that I had posted a suggestion for Tommy about fishing, Jason's post showed that he also wanted to either share his interests with me. He titled his post *Hunting,* and wrote, "I would like to learn more about hunting." He apparently wanted me to provide him with a link to a website about hunting since I had provided that same opportunity for Tommy.

Simone had written the discussion post with the clearest expectation for student responses. In this way, she could participate in more interaction with her peers. She titled her

post *What I Want to Learn More About.* Her post was conversational in its tone, and she ended it with the hope that she would get some responses. Simone's post was written as follows:

> What i wanna learn more about is... Countries and Indian tribes. I already know about some countries and tribes. But I wanna learn more about these things. Hope to get some replies :)!

Although Simone wrote that she hoped to receive some replies, none of the other students followed up with additional responses to these posts. Instead, I followed up all of these posts with responses to see if more students would choose to write within this discussion forum if they received responses from me. I also wanted to model how to write replies within a discussion forum for the students. In order to develop more interaction in the online discussion forums, I also began to consider whether or not I should require students to participate. I would have to talk to Ms. Johnson to ensure that she had class time dedicated for having the students communicate online via the discussion forums and to possibly require responses to the original posts in order to encourage more online interaction within the OLC.

Based on this first experience with the discussion forum feature of the LMS, I noted that few students had actually chosen to participate in this activity. Even Katie who requested a folder for this purpose within the focus group interview, did not participate. The low participation illustrated the lack of experience in discussion forums and that the students had not acquired the conventions of discourse, such as presenting an idea or concept and replying to other students' posts. It also emphasized that many of the activities in the classroom were teacher-directed and they were not used to being self-directed in their online work.

After noting the low participation in this discussion forum, I reviewed the responses to the technical skills forums that the students and teacher wanted to have included during the week, the *Technology Tools Discussions.* I was surprised that these discussion forums also had low participation with only seven posts; however, some students had responded to these posts. There were three posts in the discussion forum, *How Can You Learn with a Nintendo DSi?*, and four students had posted in the *iPod Touch App Exchange* discussion forum.

Rebecca had responded to my original post in the iPod Touch App Exchange with this question, "Do you go to the App Store to get apps?"

I responded to her question by with this answer, "That's right, Rebecca. You will have to go to the App Store and search for an app! Mr. C. :-)."

Jackson had written the following discussion post within the *How Can You Learn with a Nintendo DSi?* forum:

> For all DSI people there is an app called Brain Age: Math Brain Age: Language arts. It is preloaded on the DSI xl, (I think) but for the normal DSI you can buy the Brain Age app. (If you read this Mr. C send me a message to respond back.)

He had requested a response from me, so I posted the following response:

> I think that Brain Age is a great program for the DSi. My own son loves to play Brain Age, and it really gives your brain a workout! Here is some more information about Brain Age if you are interested: http://brainage.com/launch/index.jsp.

Although there were only seven students who posted within these discussion forums, two students began to reply to each other and practiced that convention of online discourse. By

modeling how to post within the forum, I think the students had a better understanding of what was expected of them. In addition, Jackson asked me to reply to his post, and I replied in order to model this practice. The use of personal technology tools was not a particular feature of the LMS, but the use of personal devices did help the students develop more interaction within the online learning environment as those students interested in learning more about their devices began sharing information about them within the OLC.

Student Feedback about Online Discussion Forums.

In the open-ended survey, Jackson described how he learned by participating in discussion forums. "I like to work online," he explained, "because it is more interactive and more social cause basically when you comment on someone or anything you give them facts that you know and in case they know more, they can reply to you to let you learn more."

Students who professed to talk all of the time with their friends described how they enjoyed the opportunities to communicate online, and students who referred to themselves as shy or who had difficulty speaking also explained that they preferred communicating online. Chris commented, "I like it better when I learn online because I don't really talk much, but online, I'm a fast reader. Sometimes, I just don't understand what people are saying. I'm not a good talker. I just like to type and read stuff on the computer."

Rebecca agreed with Chris's comment, and she also shared that learning how to communicate online extended her ability to interact with others beyond school. "I'm sometimes shy about saying some things in front of people, but now, I can type it to them. Also, on ANGEL, you can talk to people from your house without even calling them because maybe you don't have their phone number but you contact them on ANGEL. You can type to people, and

it's better because you can talk to more people. And learn stuff that they know that you don't know."

The students were positive and enthusiastic in describing their online communication, yet they had low participation in the discussion forums. Therefore, I followed up the open-ended survey with a focus group interview to clarify this discrepancy. I asked Rebecca why she had not posted in the *My Personal Learning* discussion forum even though she said that she wanted the opportunity to talk to other students online. "I didn't know that I was supposed to write in that post," she explained.

"Does Ms. Johnson have to tell you to write in a post before you will complete the assignment?" I asked.

"No," she answered, "I will write in a post to talk to my friends if I think it's interesting, and I've got something good to share with the other kids. Right now, I'm just not sure what I'm supposed to write in the post.

When I asked Robbie what he thought about having written such a detailed post, *Ancient Animals and Discoveries,* in the *My Personal Learning* discussion forum without receiving any replies, he answered, "I tried to write a post that other kids would like. I thought that I was supposed to write a story with lots of details, but no kids wrote back."

"Why do you think that they didn't reply to your post?" I asked.

"I guess that they didn't read my post because Ms. Johnson never told them they had to," he answered.

"What did you think when I replied to your post?" I asked.

"I was glad that you read it," he said. "I can write some more posts about things I'm interested in."

I noted that these students said that they preferred online communication and collaboration, but the students were not utilizing all of the opportunities available for communicating online. Jackson noted that he could learn by sharing information with another person online, and he had asked me to reply to him in the discussion forum rather than his peers. The students actually interacted more with their teacher online either by being required to post information or through the teacher responding to their posts instead of interacting with their peers. I also observed that because the teacher did not direct them to post in this forum, they did not choose to write in the post independently. As fourth graders, they expected adults to model, initiate, and lead the interaction.

Reflection and Projected Modifications

Most of the online interaction of the students this week focused on learning the technical skills necessary for interacting in an online community of practice. They discovered new features of the LMS and acquired some new expertise as they had to navigate through the LMS and into the OLC. They used the links that we supplied for their research, and some students posted content within a discussion forum on *My Personal Learning* and discussions on *Technology Tools*. They interacted as they assisted each other with their personal devices, and based on student input, I made immediate modifications to the OLC in order to provide opportunities for the students to support each other online with the discussion about technical issues. Furthermore, the students assisted each other in the use of all of these tools in the face-to-face classroom and in the online discussion forum to collaborate as a learning community. More

students posted within the *Technology Tools* discussion than in the *My Personal Learning* one, and two students began responding to each other's posts about their DSi's. Overall, though, there was low involvement of all of the students within the online discussions, and I had to determine additional ways to motivate them to submit to the online forums.

The students also described their preference for collaborative research on projects through the use of the Internet as they provided feedback this week about possible modifications to the OLC. I observed that the students were mainly locating and copying facts about their ecosystems during their research, and I wanted to explore ways to help them use the higher-level skills of analysis and synthesis of their information within their collaborative work. My first priority, though, was to develop more online student-to-student interaction to establish a greater sense of community.

They said they appreciated opportunities to communicate with their peers about what they were learning, even though they only responded to each other within the *Technology Tools Discussions*. However, they stated that they viewed online communication as the necessary avenue for completing these collaborative assignments. I noted that the research of Bernard et al. (2009) found that although opportunities for collaboration and interaction were provided to the students, they did not always choose to participate in those activities and that students often perceived themselves as more interactive online than they actually were. In order to continue to develop interaction within the OLC, I decided to provide a place for the participants to ask questions of each other and to communicate in order to develop their abilities in collaborative inquiry. In addition to having the students interact with their teacher or me, I wanted to provide additional opportunities for them to begin interacting and collaborating with each other online.

When asked about what they would like to see included in their OLC, the students said that they would like everyone to be asked about what they wanted to learn, and they would like to have a folder online where they could share what they had learned with others. They wanted more links to interactive sites and games uploaded to the OLC, and they also wanted more opportunities to communicate with each other using email. The students also mentioned that they wanted to learn more about social studies and science topics. These requests were noted for future modifications to the OLC in order to develop additional interaction.

In reviewing their posts within the discussion forums this week, the students were responsive to the involvement of the teacher and me. They explained that they liked receiving the replies to their posts, and I observed that when I modeled how to post content in the *Technology Tools Discussions,* then more students posted in those forums. I also was unsure if the students had to be required to post in a discussion forum to ensure participation or if the topics had to be more relevant to the students. More students posted within the *Technology Tools Discussions,* and that participation may have been due to their interest or expertise in using their own personal technology devices. I wanted to see if the role of the teacher would remain so influential throughout the development of the OLC. In order for the students, at this stage of the design of the OLC, to communicate effectively online, I would consider if they would have to be required to complete their posts within the discussion forum. I questioned whether it would be possible to motivate students to eventually initiate more thoughtful discussions on their own instead of having to be required to participate.

Week Two: Interacting with Content and through Online Communication

Design Issue Being Addressed

A trait of a community of practice is that the members of that community are informally engaged in the process of exploring topics of personal and communal interest (Wenger et al., 2002). In the second week of the design experiment, I wanted to implement two strategies for helping the students develop more interaction within the OLC. Since last week's discussion forums had minimal student participation with few posts and responses, I wanted to give the students more latitude to discuss topics with each other. I noted that they interacted with Ms. Johnson and me last week, and I wanted to continue to develop that communication if it was necessary for some students. Therefore, in order to initiate more interaction, the first strategy was to encourage student-to-student interaction through discussion forums. I anticipated that when the students asked questions of each other and their teacher, then the ensuing discussion would stimulate inquiry, and the students would realize there are different purposes for online communication. By having the students choose to question each other, their teacher, or me within the online discussion forum, I wanted to provide reassurance that they could choose to interact in either a student-to-student or in a student-to-teacher capacity. Hopefully, this communication would also lead to additional opportunities for collaboration within the OLC.

The second strategy was to facilitate student interaction with the content. The research of Abrami et al. (2011) found that online interaction can produce higher levels of motivation and interest and improve students' abilities to recall information and create new understandings. Based on their responses on the open-ended survey and in the focus group interview as well as in my observation of their work, the students experienced success with using links for research last

week, and I wanted to encourage even more interaction with the types of online activities that were available. To go beyond the basic recall of facts, I wanted to provide situations in which the students could begin to make more meaningful connections to information so they could analyze that subject matter and use it for their collaborative projects. The students requested to have games and interesting sites linked into the OLC, and I thought they would be engaged in these activities if I developed learning tasks that incorporated these elements. Consequently, I planned on designing virtual field trips that integrated interactive games and multimedia content into learning assignments. Furthermore, I hoped they would learn new information from the content provided on the sites of the virtual field trips and would want to communicate what they had learned with other students.

Overview of the Design

Communicating for Inquiry.

In last week's work within the OLC, I noted that the *My Personal Learning* discussion forums did not generate interaction among the students, and only about a quarter of the class participated in the *Technology Tools Discussions*. Now, however, the students had just returned from the Spring Break vacations, and many of them had begun to communicate with each other using private email within the LMS. Although Ms. Johnson and I wanted the students to discuss and reflect on the learning standards, these email conversations were social in nature. The students were choosing to talk about issues other than the academic topics we had chosen for them.

Since the students were curious about communicating with each other about topics that they were choosing, I created another folder of discussion forums and named it *Questions for My Learning Community* (Figure 5). In this folder, I created three different discussion forums:

Questions and Comments for My Classmates; *Questions and Comments for Mr. C.*; and *Questions and Comments for Ms. Johnson*. When the students had questions that they wanted to address to specific students about topics that arose in the class, they were able to use the first discussion forum to pose those questions, and the other students could reply to questions. I also thought that this would encourage the students to direct their posts to students, and the students may be more likely to respond to direct interaction with another student.

The purpose of this discussion forum was to increase opportunities for communication by encouraging the students to interact with each other in conversation. Students could also initiate topics that they wanted to discuss with the other students. Again, the students had commented that there were particular topics and questions that they wanted to address to me and to Ms. Johnson. By providing additional discussion forums for that purpose, all of the students were able to read the posts to the forums and learn by interacting with their peers even if they chose to participate solely by reading posts instead of writing their own posts. I thought that if they chose the topics, then they would also choose to participate in these discussion forums.

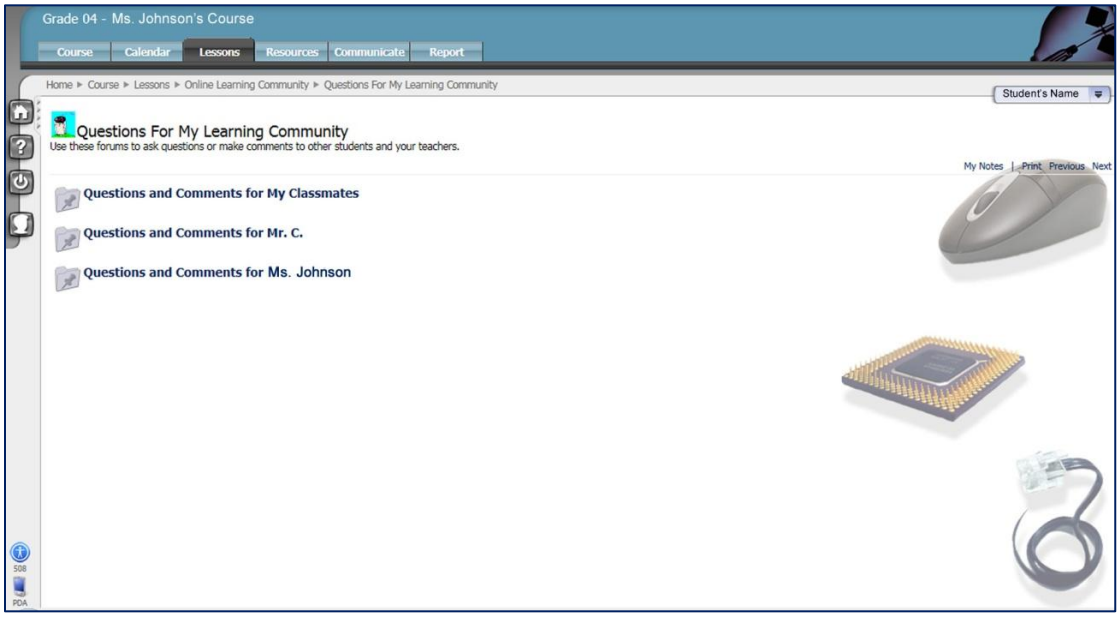

Figure 5. Questions for My Learning Community

Interacting with Content through Virtual Field Trips.

Before the students left for their Spring Break vacations, I included some new activities within the OLC. The students said that they wanted interesting activities to be incorporated online, so I developed some virtual field trips. By organizing engaging content within the LMS, I expected that the students would be more motivated to interact and collaborate within the OLC, and I anticipated that they would develop a better understanding of the information. One feature of the LMS that could encourage additional collaboration is that it can be a storehouse or repository of learning activities that the teacher is able to customize for the students.

In this manner, all of the links and content that the teacher wanted to be able to develop for the students could be housed within the learning community. Then the students could choose the ways they wanted to participate in their activities. I entitled this folder, *Spring Break Virtual Field Trips* (Figure 6). Because of conversations with the teacher and students, I knew that some of the students wouldn't be leaving their homes for Spring Break; so instead, I tried to incorporate virtual field trips related to social studies and science topics that had games, activities, and discussion forums for them to share what they had learned.

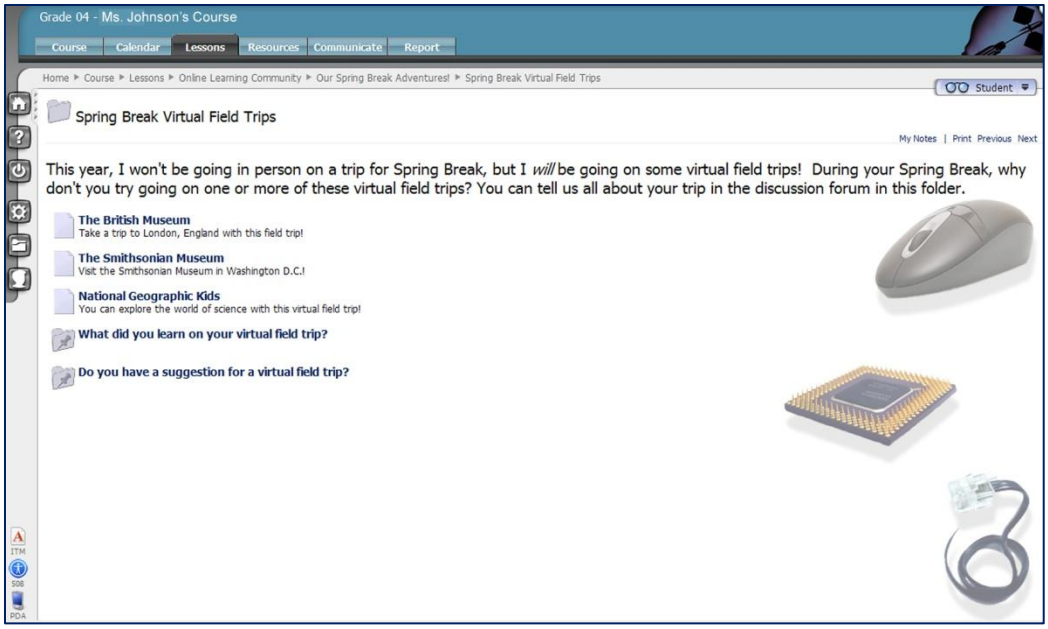

Figure 6. Spring Break Virtual Field Trips

For the virtual field trips, I uploaded links to three different websites for students in which they were able to interact online with content from various locations. At the first website, The British Museum, the students were able to take a virtual trip to London by participating in an online tour of the museum. The online section of the museum for children included information about artifacts from the actual collection at the museum. They could explore ancient Egypt, look at mummies, learn about world cultures, and dig for virtual hidden treasure. The website also included a game called, *Time Explorer*, in which students assumed the role of a curator at the museum. The students had to go back in time to rescue artifacts and objects and return them to the local people.

The second virtual field trip was to the Smithsonian Museum in Washington, D.C. In this trip, the students could learn about history, science, art, and culture. It included interactive idea labs and games for teaching the students about concepts similar to the activities the students

could complete in an actual museum. It also included detailed audio, images, and video about items from the museum's collection.

The final virtual field trip was a field trip to the National Geographic Kids website. At this website, the students were able to learn about science and social studies topics from around the world. It also included games along with images, video, and audio to engage the students. This site also included polls and questions for the students to answer as they learned in order to provide additional opportunities for interactivity.

After the students had participated in the virtual field trips, I provided two discussion forums to extend their learning through opportunities to analyze the information. The first discussion forum, *What did you learn on your virtual field trip?*, provided the students a place to describe the activities they completed and to discuss what they had learned with other students. The second discussion forum, *Do you have a suggestion for a virtual field trip?*, directed students to describe a field trip that they thought other students would enjoy or that the teacher could locate for other students.

Desired Goals/Outcomes

I anticipated that since the students would be asking each other specific questions within the *Questions for My Learning Community* discussion forums, they would interact with each other by posing questions and answering them. I was exploring ways to initiate conversations among the students and to encourage them to reply to discussion posts that were directed to them personally. Since these conversations were public, and anyone could read them and participate in them, I intended that the students would be able to learn how to communicate effectively in online discussion forums by observing the online interaction of their peers. Lave & Wenger

(1991) referred to this type of involvement within a community of practice as *legitimate peripheral participation* as members of a community learn by observing the activities of capable and confident peers, and I hoped that this strategy would help to develop more interaction within the OLC. This was an attempt to create a supportive online learning environment so that the students could communicate effectively with each other and learn from each other.

By providing links to resources within the LMS, I wanted to motivate the students to interact with engaging content. I expected them to choose to spend time outside of school to complete those activities without the requirement to participate. I also anticipated that the students would be interested in interacting with this content as well as to ask for similar types of activities throughout this investigation. Finally, I attempted to utilize the students' recommendations into the design of the OLC to help them develop a sense of ownership in the learning process, and thought this incentive could encourage further collaboration within the online learning environment.

Results of Implementation

Discussion Forums for Inquiry.

I had designed the *Questions for My Learning Community* discussion forums to be ongoing and available throughout the weeks of the study, and I noticed that none of the students had posted within the *Questions and Comments for My Classmates* forum during this week of the design. However, two students had posted within the *Questions and Comments for Ms. Johnson* forum, and five students had posted within the *Questions and Comments for Mr. C.* forum. Ms. Johnson and I replied to all of the students who had posted questions or comments to us. Mindy

was one of the students who posted in the forum for Ms. Johnson, and she was going to be moving to another school district with a few weeks. The thread of her discussion is as follows:

Mindy: :(You are a awesome techer I will miss you a lot Ms. Johnson :(

Ms. Johnson: I will miss you, too, Mindy. You have been doing very well this year!

Aaron posted a question to Ms. Johnson, and Tommy also posted within the following thread of their discussion:

Aaron: Can we still communicate when we're in fifth grade?

Ms. Johnson: We sure can. I want you emailing me and telling me how 5th grade is and how hard you are working in 5th grade.

Tommy: Probobly

In the *Questions and Comments for Mr. C.*, the following thread of discussion involved a question regarding an application (app) for the iPod Touch:

Katie: Dear Mr. C.,

At school could you Bump someone with the app to get there apps?

Sincerely,

Katie N. Perez

Tim Clark: Hi Katie,

Great question! I had no idea about how to do this, so I had to test it. Here is what I've figured out:

1. The students would need the "Bump" App. Here is that link http://itunes.apple.com/us/app/bump/id305479724?mt=8.
2. You have to share with someone that you accept sharing with. Talk to your parents about this and get their permission.
3. You don't really share the app completely. You are just sharing the link to the app store, so a student still can't download the shared app at school. Once it is shared, the student would have to go home and have their parents download it from the iTunes store. This requires the parent to enter the Apple ID and password. Then the app will download. Remember that if the app costs money, then the parents would have to agree to buy it.
4. If the student downloaded the app at home, then the next day, the student would be able to use it at school. I think this is a good way for the teacher and students to share free apps easily, and the great thing about it is that the parents are involved, too!

Good Thinking! Let me know in this discussion forum how and if this works for everyone!

Mr. C.

In two of the posts that I received within the discussion forum, students simply thanked me for helping them with the LMS, and in another post, a student thanked me for allowing them to bring their technology devices to school. In the final discussion post, Aaron asked me the following question:

Aaron: Are we aloud to email anytime when we use are technology?

Tim Clark: I'm glad that you would like to begin communicating with email. I have set it so that students are now able to email. Just remember to be appropriate in your comments to your classmates! :-) Mr. C

I noticed that different types of questions were directed to Ms. Johnson than to me. The questions to her were more about the students' relationships with their teacher and being sad to think about the relationship ending as the students moved on to other places or grade levels. The questions directed to me were requests for assistance regarding technology or technology-related issues. The students realized that I had this technology specialist role within their classroom. I also realized that I had developed these discussion forums for the students to practice inquiry, but I was the one who had to research the "Bump" application in order to respond to Katie's questions. I did not know what this application was until I read about it in her post.

The students had interacted with both Ms. Johnson and me within our discussion forums and we had modeled how to participate in online discourse. Consequently, I decided to wait to see if the students developed more interest in posting in the *Questions and Comments for My Classmates* forum later in the investigation as they developed more skills in interacting within the OLC. I think that at this point, they were still unsure of how to use these forums, but I would be prepared to facilitate their use if the students became more motivated to use them for interacting with each other.

Observations of Virtual Field Trips.

After the students returned to school after their Spring Break, I noted that no students had actually participated in or completed the virtual field trips. I questioned the students about why

they did not work on these assignments and wondered if they were not engaging enough or if the students did not spend much time online when they were out of school. I discovered that although they did not choose to work on those activities, Ms. Johnson had told them to go online and review CRCT materials over the Spring Break, and most of the students did go online in order to complete that testing assignment that she had given them. My first thought was that the students were not used to going online and choosing instructional activities to be completed independently. Although the students had asked for the opportunity to make choices online, they were not used to going online on their own to study topics of their own interest, so they waited for a teacher to direct them in what to do. Also, when Ms. Johnson required the students to go online to complete her assignment, that requirement took priority over the assignments where they could make choices.

Later in the week, I questioned some students about why they chose to complete Ms. Johnson's assignment for reviewing for the CRCT but did not choose to participate in the virtual field trips. I was somewhat surprised by Rebecca's answer. "Since the beginning of the year, we knew we needed to do really good on the CRCT," she said. "We have been practicing for it for a long time. So we needed to get ready."

Tommy agreed with her, "Yeah! The test is coming up soon and we missed a week when it snowed during the winter."

Chris shared the same reason that other students gave last week about participating in discussion forums without being required. "I didn't know that I was supposed to do it," he answered.

Some of the students had been emailing each other over the Spring Break vacation through the LMS, but they did not complete these activities.

I asked Elise, "Did it matter to you that the virtual field trip was made for you to work on independently?"

"No," she said, "I was just really busy during my vacation, and I spent time with my friends."

"But you also spent time in the LMS sending emails," I pressed. She had already explained that she had emailed Mindy during her vacation.

"Me and Mindy emailed each other, but we were talking about other things like what we were doing during our time off from school," she answered.

The activities were designed for the students to work on independently, and the students stated that they preferred activities when they were working with each other. The virtual field trips were organized for the students to learn by reading information, viewing pictures, and playing games. However, the information in those trips had to be explored individually, and the games included in the websites of the field trips were not multiplayer games. The students would have had to play them independently, but maybe if they had the opportunity to interact with the peers in these trips, then the level of engagement might have been higher. I asked Kevin if he would have completed online activities if he had been working with his friends online.

"I think that I would have done the activity if I knew we were supposed to do it," he replied. "I think it would have been fun to work with everybody else if they were doing it too."

Ms. Johnson decided to require the students to complete the virtual field trips as an assignment within the classroom. The students completed the online activities individually and posted within the discussion forum about many concepts related to those trips that that they had learned. However, without requiring the students to respond to each other, many of them had only listed facts such as "mummies in Ancient Egypt" instead of elaborating on information or communicating with each other about topics. This also made me consider what types of prompts may be necessary to elicit more interaction. When the students responded with factual information about these topics, they did not elicit on-going discussion. However, the students had different perceptions about their interaction and communication within the discussion forum.

In the weekly open-ended survey, some students described that they began to interact with each other by participating in the discussion forums following the virtual field trips. Candi noted, "I love the virtual field trips. We got to see what others learned about on the virtual field trip discussion board. That's how we connect."

"I liked going on the virtual field trips because you can learn what happened in history," Simone explained. "Like Ancient Greece and Ancient Egypt and a bunch of other places in the world. And when I'm done I can post what I learned. I like that you can see what other people said they learned too in the discussion."

Tonia also expressed her preference for this activity. "I think that there should be more virtual field trips and more online discussions. I never got to do them before. It helped me to learn more in a fun way and gave us more things to talk about."

"It was good to be able to choose which trip I wanted to do," Luis stated. "We all got to do different things and tell about them."

The students were very positive about "telling" about the things they learned on their virtual field trips and enjoyed completing the assignment in class. I had to work on aligning my expectations for how the students were currently able to interact online. Tonia had noted that she had never participated in that kind of activity before, and the students were content with telling about what they had learned. If the students had made more meaningful connections to the information, the discussion forums, as I designed them, were not eliciting an analysis of the content, nor were they promoting the qualities of interaction among the students that I thought were necessary to demonstrate they were learning from each other. However, the students were telling me that they were interacting with each other when they completed these activities. Although I wanted them to choose to begin working on activities independently, most of the students still needed more direction in initiating online interaction.

Social Communication to Encourage Online Interaction.

Since the Questions and Virtual Field Trip discussion forums were not generating sufficient student-to-student communication, Ms. Johnson suggested we initiate a discussion about what students had done over spring break. Based on Maher's (2009) findings about social discourse in his research on discussion forums with elementary students, I thought that this could help develop more interaction within the online learning environment. For this spontaneous design modification, I created a new folder, *Our Spring Break Adventures!,* and moved the folder for the Spring Break field trips into it. Then I developed a discussion forum about what they did during their Spring Break called, *What did you do for Spring Break?,* and we decided to require them to write a post for this forum to observe if there was a difference in the interaction that occurred. I was specifically looking to see if the students included more information that they

elaborated with specific details about their activities. I also wanted to determine if they would respond to each other in the discussion and what generated additional responses.

Since this was a required activity, all of the students participated in this discussion forum, and I reviewed their posts to note how they communicated with each other online. Then they wrote responses to each other to ask more questions about their vacations, and the original students answered those questions with additional information. Both Ms. Johnson and I responded to every student within the discussion forum. I noted which comments or posts seemed to inspire other students to reply to those discussion posts. Here is a thread from Candi's post from the discussion forum:

Post Title: What I did for Spring Break – By: Candi

Candi: For spring break I went to Six Flags. My favorite ride was The Great American Scream Machine. It is a huge ride. I practiced alot for CRCT. Spring break was alot of fun. Good luck on the CRCT everyone.

Ms. Johnson: I have a season pass for 6 Flags this year. I may see you there. I am not that great on the rides though. The last time I went, I felt sick, and after three rides we went home. I will have to do better next time.

Tim Clark: Wow! I think the Scream Machine is really scary. Have you ever noticed how you can love a scary ride and hate it all at the same time?

Candi: It was scary, but I loved it!

Mallory: Dear Candi, I think it was awsome that you went to Six Flags. I went to Six Flags once, and that was in the summer two years ago. I went with my family (not the

whole entire family just my mom, dad, my two brothers, and I. :)) We had a blast. The only rollercoster I went on was a small one and I still got scared, like on SpongeBob, but it wasn't that small. My older brother didn't go on any rides, because he would pyuque [puke] either during or after the ride. Sincerley, Mallory.

Denise: Was it fun?

Candi: It was alot of fun

Janie: I don't like the scream machine because it jerks my head all around and it hurts my head to.

Simone: Dear Candi, I wish I got to go to Six Flags. That sounds really cool. Did you ride the Goliath? I really wanna ride the Goliath so bad. Your Spring Break seems awesome compared to mine. Mine was kinda bad especially at the end, that Friday was the worst!!! I hope you had a great amazing time! Sincerely, Simone. P.S. please reply!

Candi: I'm sorry you had a bad spring break. I didn't rid Goliath.

Kristy: That sounds like fun and wish you luck on the CRCT as well. You will do great.;)

Denise: Who did you go with to Six Flags? Was it full of people when you went there?

Candi: Six Flags was really full, and I went with my family.

The students responded to the other posts in much the same way that as Candi's post above. At this point, I made several observations from this interaction. The students were able to post detailed information about this topic that was based on their real experiences. Students would respond to questions directed to them in their posts. The students participated more in the

discussion when they were required to make an initial post. Their responses showed that they were interacting with each other as they made connections or repeated content that was included in the original post. For example, in responses to Candi's post, the students made references to times they had been on roller coasters because Candi described her experience on one. I also noted the students' references to the upcoming standardized tests, and I thought this confirmed Rebecca's statement during Week 1 that she was very concerned about her performance on the test when she explained why she did not choose to work on the virtual field trips. It seemed like it was a concern of many students. I was compelled to understand why particular students seem to be so engaged by specific topics that they were motivated to respond to those topics.

On the other hand, Jackson discussed a more unusual experience within his post, and the students also made many comments to him in the following thread:

> *Jackson:* The things that I did for Spring Break: I went to good restaurants, I went over to my friends house, getting a good night sleep for a change, and I stayed home and relaxed for the time being. (Didn't go anywhere.)
>
> Favorite Thing I did for Spring Break
>
> Where I went to eat: I went to tons of places to eat, but one place that I loved was a Brazilian restaurant in Marietta it is called Copacabana, I had a passion fruit mouse with cream on it and also chicken hearts. (By the way it was not horrible it was great!!!!!)
>
> *Denise:* Did you like the chiken hearts?,were they really hearts?
>
> *Eva:* What do chicken hearts taste like, and are they cooked a special way?

Tommy: I did not know chicken hart would be good but I will stick to wings and brest. Just saying.

Tim Clark: Tommy, your comment was so hilarious to me. I actually like the chicken hearts and livers the best! :-) But wings are good, too.

Eva: What did you say? I didn't know a word you said!

Eva: Hi about the chicken hearts they make me lose my apatite!

Tim Clark: I like to go to restaurants, too, and we went to several over Spring Break. After reading your post, I really want to go to that Brazilian restaurant you described. I love passion fruit, and that dessert sounds great. I also like chicken hearts, too. They were on the mousse? I couldn't picture that. Whenever we make chicken at my house, my wife roasts the liver, the gizzard, and the heart separately for me because I love them!

Jackson: Thank you Mr. C if you want to go to this place here is the adress Copacabana Marrieta, GA, 30067, 2555 Delk RD SE.

Mallory: What are passion fruits and what are chicken hearts? Are chicken hearts chicken shaped like hearts?

Jackson: Not really Mallory

Tim Clark: Hey Mallory, you can see a picture of a passion fruit here http://en.wikipedia.org/wiki/Passiflora_edulis. Passion fruits taste a little sour, but they are awesome! Jackson can tell you about the chicken hearts!

Mallory: Mr. Clark, are pomagranites passion friuts?

Tim Clark: No, the link has a picture of a passion fruit. It grows on a vine.

Ms. Johnson: That's it! I love passionfruit!

Kristy: was it really chicken

Kristy: Yummmmmmmmmmmmm:)sounds good

Mindy: Chicken hearts are good?

Ms. Johnson: I visit a Brazilian Steakhouse in Marietta quite a lot. It is called Sal Grosso. Have you ever been there Jackson? You may want to try that Brazilian Restaurant. I love passionfruit. I made a banana cake with passionfruit cream cheese icing over the spring break. I had to go to a special shop to purchase the passionfruit to make the icing. I enjoyed not having to get up so early to come to school over Spring Break.

This unusual topic initiated discussions about other topics that could possibly become a learning experience for other students, e.g., pomegranates. I also focused on how the students were incorporating what they already knew about a topic in order to make sense of this novel experience that Jackson described for them. Mallory already had experience that chicken could be processed into appealing shapes and nuggets, and her reply in the above thread of discussion illustrated that she thought that the chicken was being processed into the shape of a heart. To her that made more sense than in eating an actual chicken's heart. This analysis and synthesis of new information were essential skills that I wanted the students to develop about academic topics, content, and standards.

Ms. Johnson and I read all of the students' posts about Spring Break and responded to them. I noticed that when we wrote to the students in the discussion forum, then they were more likely to reply back to us. Usually, when we responded to students' posts, they would simply reply to our comments about their original posts within the discussion forum, and these replies were visible to everyone. There were a few students, however, who would use the email function of the LMS to respond back to us so that their replies would be more private.

The few emails that I received through the LMS were related to technical issues since the students viewed that as my role in the community. A benefit of using the email feature of the LMS is that it is sanctioned by the school district, and it can only be utilized by individuals enrolled in the course, and the emails could be documented. This provided greater online safety for the students. Ms. Johnson, however, received several emails from the students, and these messages were often more personal. In one discussion post, a student, Elise, described that her best friend had spent the week with her, and she had stayed outside late one night with her friend and had walked around her neighborhood after midnight. Elise's complete discussion post is included in Appendix I. In the Ms. Johnson's response to Elise, she made this comment:

> *Ms. Johnson:* Sounds like you had fun but I don't like the walking around the neighborhood at night when your parents do not know where you are. That is not good. You have to be careful.

Elise wrote an email to the teacher to describe how all of the young people in her neighborhood went outside during weekends and vacations when they could stay up late at night to play games, talk to each other, and walk around. She also explained that her mother was also visiting with friends in the same neighborhood, so she knew where Elise was at all times.

Students, however, also complained about some of the content of the online communication in the LMS. In an email to Ms. Johnson, Katie described an email message she had received from Eva:

> Dear Ms. Johnson, I got an email from Eva that wasn't nice. She said that her BFF [Best Friend Forever] was Simone and that I coulnd't be their friend to. Sincerly, Katie.

Ms. Johnson then discussed friendships with these girls in order to find a resolution. It was important to know how big the problem was between the students and taking the time to help them with these issues. Communicating online gave the students another place to have conflict, but it also gave them a place to share concerns with their teacher.

In addition, some students were becoming overly critical of each other in the discussion forums. Many of them were focusing so much on the grammatical errors that students made in their posts. Robbie wrote this post about his vacation:

> *Robbie:* My Favorite Ride was The Schorcher!!! The Schorcher Was fun because of the loops and twists and going down veryfast!!! It was very Adrenaline Rushing!!!! My Favorite BaseBall team is the Braves. They are pretty good.

In response, Phillip wrote the comment, "remember to go back and check your work!"

Furthermore, some of the students were beginning to experience conflict with each other in their communication. The following post is an example from Mallory's discussion about her vacation:

> *Mallory:* My fav thing about Spring Break was playing with my friends in their house, outside, and in their sprinklers. Their my fav activties, because they were really fun. I

didn't do any CRCT practice, because the word break in Spring Break means that you're on a break from school work, and you're suppost to play and have fun, and that's what my mom said, too.

In response, Elise made the following comment:

Elise: Well that was a bad idea!!!!!! You always practice for the CRCT or YOU will fail! Also, what your mom said about that wasn't true!!! The word "break" in "spring break" does NOT mean that it is a actual "BREAK"!!!!!!!!!!!! I don't think that you should've been playing! I played with my friend Sabine AFTER I practiced at lest an hour before I went to play!!!! THAT WAS JUST A BAD IDEA NOT TO PRACTICE!!!!!!!!!!!!!

Then Mallory responded:

Mallory: No!!! Becase my mom and I thought that the Spring Break ment to get a break from school.

During the week's focus group interview, Miguel said, "I like to do the work online but they make me mad when they say I make mistakes." Miguel was in ESOL, and I wanted to make sure that students who had some difficulty in writing or communicating still felt comfortable with participating online.

The following thread of discussion is from Miguel's post about his vacation:

Miguel: At spring break I went to my cousens house, they have 6 brothers and 2 sisters. I had a sleep over at thier house for 4 days,we played there PS3 and played outside to and play cops and robers at the yard and had realy fun. That day we wached movies like

creepy,scary,funny,and silly.Then wen we went to sleep we went to sleep we were taling storises at night. We woked up and went to the Flea Market and got some stuff .

Maggie: whats cops and robers? from, maggie.

Alejandro: Miguel I want aPS3 For my bithday and cobis and robers is realy fun.

Mindy: You need to check your work. You spelled alot of words wrong like cousins, watched, and stories!!!

Based on these irritable and unkind messages, we decided that we should design a lesson in netiquette for next week. We wanted to make sure that we addressed the issues of how to treat each other online and also being more patient with students who made mistakes. Some of the issues that the students brought up were related to learning how to interact with each effectively, and they needed this opportunity to develop a sense of community.

In this week's open-ended survey, the students expressed a preference for the discussion about the Spring Break activities over the other discussion forums. They noted that there were several posts that included many details and experiences that they found interesting. The posts that initiated the most replies shared information or ideas that were novel or unusual, included exciting experiences that the students related to, or included elaborate details.

Katie described the differences between online and face-to-face discussions. "It starts when someone posts something online and another person finds it interesting. Then they get into a conversation. A bunch of people can see what they wrote and butt into the conversation. In real life, people can't see your conversations after you've already had them and then butt into them."

Many students in the English to Speakers of Other Languages (ESOL) program also began interacting through the Spring Break online discussion. According to Denise, "The best part of it is when you get to discuss because sometimes you don't want to talk because you are shy but on here you get to write whatever you want to others."

Alejandro, another student in the ESOL program, discussed his favorite post by another student in the class. "I liked Janie's spring break because she was stuck in the car for 8 hours and when they were with their grande parentes they were like at 10 o'clock and she slept at 12 o'clock and in the morning she when to church and when church was finished they went to Cici's pizza and when they were finished they went to a water park." Ms. Johnson was surprised how his writing was continuing to improve through the constant written communication in the OLC and through his review of another student's written work.

In her description of how the OLC was developing, Eva related, "It`s been going really well. Lots of people are sharing their ideas and helping each other."

Finally, Nadia, described changes from her work due to online interaction and collaboration by noting, "It is changing by giving me time to understand."

The informal interaction about Spring Break assisted them in communicating their ideas to the other students. All of the students in ESOL in this class were native Spanish speakers, and Ms. Johnson noted that they had been having more difficulty communicating verbally or through writing during the year and that they stood back and let other students do the work. The asynchronous nature of the posts gave them some time to prepare organize their thoughts so that they were able to interact more with the other students. They described how they understood more of what was happening in their classroom. The online work and communication was

having an impact on their activity within the face-to-face classroom, and these students described this change within this week's open-ended survey. Ms. Johnson also noted that they were participating more with the other students.

Reflection and Projected Modifications

Although I tried to create opportunities for the students to interact within the *Questions for My Learning* Community discussion forums, I observed that most of the interaction of the students with each other and their teacher occurred within the discussion forum about Spring Break. This design modification was spontaneous, yet it initiated more communication within the OLC than the purposefully designed activities. This observation corroborates Maher's (2009) research in the role of social discourse as being an essential precursor to other forms of online communication. Because the students were discussing events that they had directly experienced, it was easier for them to share that information with others, and it was also easier for the students reading about those experiences to make connections to them. They wanted to know what people were thinking about their own ideas or posts.

At this stage of the design, I wanted to determine if they preferred to choose their own topics, or if they preferred thematic topics chosen by their teacher, and I also considered the topics that encouraged more online interaction. I wondered whether the concept of eating chicken hearts was so unexpected for the students that the novelty of that idea just instigated curiosity and made them want to talk more about it and ask each other questions. The unusual content of that post encouraged other students to respond to Jackson in the discussion forum. Having informal discussions within this forum proved to be necessary to incite more interaction within the OLC. It enabled the students to learn more about each other, and this understanding was beneficial to the community of practice.

The students were still not used to making their own choices about completing activities or participating in discussions, and Ms. Johnson had to require participation in discussion forums or on assignments that were related to academic topics. However, the students stated that they enjoyed participating in those activities and learning new information within the context of the OLC. The students also commented that discussion forums needed to continue being utilized throughout the OLC, and they wanted more places to discuss issues with the entire class. I decided to explore how to keep nurturing online discussion; to encourage it to become about educational topics; and to find more topics that inspired more conversation.

I had observed that the students had usually listed facts from their online research in Week 1 and from their experiences with the virtual field trips, but I wanted them to interact with content and collaborate with their peers to analyze and synthesize information in meaningful ways. We had utilized the discussion forum feature of the LMS in an attempt to achieve this understanding with little success, but there were still other features of the LMS that we had yet to explore that could possibly encourage additional interaction and collaboration. Two of these features were the blog and wiki features, and by incorporating these tools of the LMS within next week's projects, the students would be required to write collaboratively about the information they learned from their online research.

Next week, we would begin the group projects on Native American tribes and explorers, and we would have to incorporate more situations for encouraging online collaboration, in order to develop more meaningful interaction. I realized that broad participation involving everyone and the desired quality of student-to-student communication about academic content was proving elusive, and I continued to explore new ways for inducing this interaction and collaboration. For next week, I anticipated that the implementation of the blogs and wikis could assist the students

in participating in collaborative work within a smaller group and with a more specific task to complete.

The role of the teacher in facilitating and requiring effective interaction was also becoming crucial to the design of the OLC, and I wanted to see if she would continue to have such an important role in the development of the learning community. During this past week, I noted the following ways that we, as teachers, facilitated the interaction of the students: (1) requiring student participation when necessary; (2) organizing online content within the LMS; (3) modeling interaction by communicating online; and (4) encouraging additional interaction by responding with questions. Planning and designing engaging online learning activities and discussion proved to be an important teacher responsibility in the development of online learning interactions.

Week Three: Collaborating through Features of the Learning Management System

Design Issues Being Addressed

From the implementation of last week's design strategies, I learned that using the communication features of email and discussion forums was effective for developing interaction, especially when the students were required to participate and when the communication utilized social discourse about personal experiences. However, I noted that the students needed more guidance in the appropriate ways of participating in online communication and the email and discussion forum behaviors. Therefore, this week we would model netiquette for the students by writing a practice email; discussing the importance of appropriate communication, and having the students watch a student-created video on netiquette. By developing and practicing skills in appropriate online discourse, the students were more likely to feel comfortable within their

online learning environment (Lin et al., 2008), which could lead to higher levels of interaction and satisfaction.

Another focus of the OLC design this week was on the use of more features of the LMS, namely the blog and wiki tools, to encourage collaboration as the students began their projects on Native American tribes and explorers. This online collaboration would provide them with additional opportunities for learning through their interaction and communication beyond the use of discussion forums. We decided to require student participation in these activities to observe how they organized their roles within their collaborative groups. With the use of the wiki tool, the students could collaborate with each other as they researched, summarized, and organized online information about their topics. Using the blog tool could initiate student collaboration as they analyzed the information they had included in the wiki and then synthesized that information into their Native American tribe or explorer story. Although these functions were components of the LMS, to use them meaningfully with the students, Ms. Johnson and I added them into the OLC along with directions to facilitate the collaborative student work.

Overview of the Design

We decided to model how to write emails within the LMS and discuss how to use proper Internet etiquette, commonly referred to as "netiquette," when students communicated with others in the LMS. As a result of this discussion coupled with increasing participation in online communication in the OLC, I uploaded a video on netiquette for the students to watch within the OLC. I placed the link to this video inside of the *Questions for My Learning Community* folder because I thought that the students might begin using those discussion forums for additional communication.

For the study of Native American tribes and explorers, I designed a folder to contain all of the collaborative work that the students would be completing, and I titled this folder, *Our Community Projects* (Figure 7). I then created two additional folders within the *Our Community Projects* folder. The first folder was called *Explorers Project*, and it contained a folder for each explorer included in that fourth grade standard. I named the second folder the *Native Americans Project* and, likewise, developed a folder for each tribe in the fourth grade standard and placed those folders within that project folder.

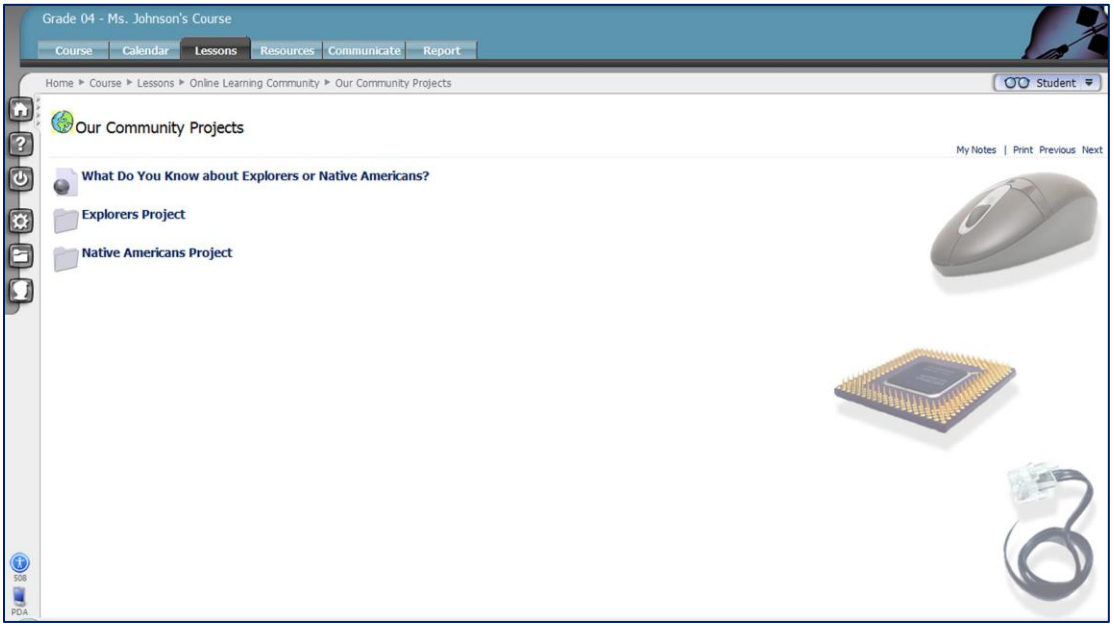

Figure 7. Our Community Projects

Within each of the folders, we added a wiki for the students to record factual information about the particular explorer or tribe. We also included a story blog for the students in each group to write a collaborative story about a day in the life of the explorer or of a person from the tribe. Finally, we included a discussion forum to be used as a project library so the students

could upload links to all of the resources they had used to learn more about their explorers or tribes.

Desired Goals/Outcomes

One goal for this week's design was to facilitate online student-to-student interaction by helping the students understand and develop strategies for appropriate communication. By modeling good communication and uploading a video on netiquette, I hoped to emphasize appropriate behaviors in an online community and to observe the students being more tolerant of each other within their posts. I anticipated that the students would need to utilize these strategies in further collaborative online work in this study, and how they internalized these concepts would be evidenced by their future communication. This focus on netiquette could help to develop positive behaviors among the participants, and I predicted that this effort would have benefits that extended even beyond the online learning environment. Since they were beginning collaborative work, I wanted to see if improved netiquette could help them resolve problems and negotiate responsibilities so that their groups could demonstrate interdependence.

As the students were working together with the wiki and blog features of the LMS, another goal of this week was to determine if we were able to facilitate collaboration using these tools. I would note if they were sharing the workload since they had complained about having difficulties with this practice earlier in the study. Specifically, I wanted to see how engaged they were in the task of collaboration with the following indicators: (1) communicating and attending to the input of the members of the group; (2) negotiating responsibilities for the completion of the projects; (3) organizing the wikis with summarized information; and (4) synthesizing the content from each wiki by writing a detailed story in the blog. By organizing these features

within the OLC, I thought the students would find it more efficient to use these tools in their collaborative work. I perceived that the use of these features would provide the students with additional opportunities to interact with each other as well as with the content of the learning standards in order to have a more meaningful learning experience.

In this situation, the wikis and blogs would differ from the discussion forums in that students would have specific tasks that would have to be completed regarding the learning standards. The discussion forums were more open-ended and voluntary, but the students would be required to participate in these projects. The students posted individually within the discussion forum, and all of the students were encouraged to submit their posts within that same forum. However, the wikis and blogs would be assigned to a small group, and the information presented would be specifically developed by the group members. Therefore, there was more accountability for the ultimate project outcome attributed to each small group member making it more difficult for the students to refrain from participating.

Results of Implementation

Netiquette to Facilitate Interaction and Collaboration.

Some of the students complained about the emails they had received from other students, so Ms. Johnson proceeded to give a lesson on writing emails and selecting individuals or the whole class to receive the emails. We also utilized this time to discuss netiquette and being aware of an audience so that the students would communicate appropriately with each other online. We explained that netiquette in our OLC also entailed understanding how to preserve another person's email space and storage by not sending trivial emails. The tone of emails was discussed and how different language is used when communicating with different people. Ms.

Johnson also explained that when students write emails, the receiver is unaware of the facial expressions and body language that is utilized in face-to-face communication. So when a person says something in writing, he or she should understand that everyone might not interpret the message the way it was intended.

I uploaded a video on netiquette to use for online communication within the OLC, and we provided time for the students to watch the video in class. We followed up the video with a discussion of the types of communication that were necessary and appropriate for the students to have when they were interacting with others online. The students responded to these activities within the focus group interviews.

"I was glad that we talked about appropriate online behavior during class this week," Katie asserted. "It was getting on my nerves that Eva kept emailing me that I couldn't play with her during recess."

Phillip also commented, "Some people in the class really complain when you don't get things right when you are writing in a forum. I think they need to pay attention to the netiquette video to see how to say things in a nicer way." I noted that Phillip made this comment, but he was one of the students who had actually told a student that he was writing incorrectly in his post.

Eva also explained that writing in the discussion forum helped her to get to know her classmates better, but she was the student who wrote an unfriendly email. Again, I observed that they perceived that they were interacting effectively even though we were more aware of some conflicts. I asked the students more about this contradiction during this excerpt from the interview.

"I noticed that many of you said in your open-ended surveys that everyone was getting along much better since you participated in the Spring Break discussion forum and in the netiquette activities, even though some people had conflicts or problems in their online communication. Why do you think they had those problems, I asked?"

"Some of the kids were just being mean," said Katie.

"Did you feel like it was resolved when Ms. Johnson talked to you both?"

"Yes, we have been getting along more, but she's really not my best friend," she noted.

"Are you able to work together on your projects?"

"We can work together, but I like to work with other people more than Eva," she said.

Although the students had some conflict, they were working through learning how to interact online. Having a lesson on netiquette also made the students more aware of behaviors to use when they were involved in online collaboration. By being involved in this interaction, Ms. Johnson was able to model and facilitate appropriate online interaction.

Encouraging Collaborative Learning with Wikis and Blogs.

To encourage further online collaboration, we decided to utilize the wiki and blog features of the LMS. These were new experiences for the students, so we had to explain how to use these tools. Ms. Johnson and I thought that we would all either study Native American tribes or explorers, but six students wanted to learn more about explorers while the other students wanted to learn about Native Americans. We decided that those students could go ahead with their study of explorers while the other students learned more about Native American tribes. We planned to connect the research about these two standards later in the study.

We then put the students into groups comprised of 2 to 3 students per group to begin researching a particular tribe or explorer. As the students conducted their research, we had them enter information about their topic into a wiki within their project folder. We instructed each group to review the standards for their particular tribe or explorer (Appendix H) to determine the specific areas that were essential for their research. For example, to research a Native American tribe, the food, clothing, shelter, location, customs, and culture may all be essential elements to an in-depth understanding of that tribe. In the wiki, the students had to create an entry for each of the above elements, and we showed them how to create those entries within the wiki that we had added to their online project folder. Therefore, the students had to collaborate in their groups to determine the essential elements, research the information online, and summarize that content within their wiki.

After the students completed their wikis, we instructed them to use that information to write a collaborative story about a day in the life of a member of that tribe or of an explorer within a blog that we added to their project folder. In addition, we directed them to add specific details that would help a reader to understand what life was like for that tribe or explorer. By having the students create the story blog, they would have to do more than just list facts. As the students conducted research, they sometimes copied facts directly from their online resources, but writing a story would force them to synthesize factual information as well as use their personal and collective ingenuity. Therefore, this assignment was also to be completed collaboratively with input from all of the members of the group.

The students quickly began researching their tribes and explorers online using the technology resources available. After having conducted research about ecosystems earlier in this study, they were more skilled about finding information for this project. While some of the

students searched for information, the other group members entered that content into the wiki. In this manner, the students collaborated in the production of a new information repository for their tribe, and this facilitated better content organization as the students summarized this material.

Katie and Nadia were effective in their collaboration in that they found information to include in their wiki on the Seminole tribe. They organized that information effectively within the wiki as they summarized it into several entries. They also negotiated responsibilities and took turns writing the entries for the wiki. Katie was usually an out-going leader in the class, and Nadia was a student in ESOL who had begun participating more through her online work. The following entries are from their Seminole Wiki:

Nadia: Shelter for the Seminole

The Seminole used to call a house a chickee, and houses like these can be found all over South Florida. The chickees were made out of wood and plaster, and every five years they changed the roof that was made from palmetto fibers. Chickees were usually arranged in villages, but the Seminoles began to live in small groups in the Everglades as some of the tribe moved further south.

Katie: Seminole Clothing

The first Seminoles that moved to Florida wore buckskin clothing, but the climate in Florida was too hot for those kind of clothes. Then they changed to lighter cloth brought from traders. They had to stay covered because if they weren't covered they would be bit by mosquitoes or other gross insects. Later they made clothes out of materials like calico and cotton. They also wore capes like shirts.

During the open-ended survey, I questioned the students about how they predicted their projects would turn out. Katie described how successful she thought her project would be with Nadia because of how they shared the workload. "I predict that my project will turn out very well. Everybody pulled ther own weight. I did half of the information and half of the typing. Nadia did the other half of both information and typing.

Nadia explained how working with her partner helped her to complete her work in less time. "I think that when I do it individualy," she explained, "I take more time and when I work with a partner I take less time. For the project I did two wikis. And my partner did two wikis too. That is why I think that it takes less time to do it with a partner."

Although Nadia and Katie collaborated effectively to create the wiki on their tribe, not every group was as successful in working together. Luis was partnered with Mallory to research and present the information on the Pawnee tribe. Luis was a leader in the face-to-face classroom; he was athletic and out-going with a good sense of humor. Mallory was smart, but she had difficulty working with the other students. Ms. Johnson put them in a group together because they both wanted to research a tribe, and she thought that Luis would be able to tolerate some of Mallory's complications.

As they began their research, Mallory was immediately frustrated with how slowly that Luis was reading and finding information. Luis was a native Spanish-speaker, and he usually required additional time to understand the content he was reading. Luis was also aware that two of his friends, Alejandro and Miguel had been assigned to work together on the Hopi tribe. The other two boys were laughing together and enjoying their collaborative research. The following

excerpt was recorded from the interaction of Mallory and Luis in class as they worked on their research:

Mallory: You need to let me do the research because I can look it up and write it faster than you do.

Luis: I can do it too.

Mallory: But you take too long, and we don't have that much time.

Luis: I found the information on the shelter. It says that the Pawnee lived in lodges.

Mallory: That site doesn't have pictures and we have to make a Photostory.

Luis: But first we have to make the wiki.

Mallory: Let me do the research and the writing. You aren't fast enough.

Luis: Then you can just do it by yourself.

Mallory: Fine, I will.

Eventually, Luis complained to Ms. Johnson that Mallory would not share the work with him, and he wanted to work with Alejandro and Miguel. He gave the reason that he always wanted to learn more about the Hopi tribe. Ms. Johnson did not try to make Luis work with Mallory. She allowed him to change to the other group, and she told Mallory that she could work by herself on this project. Ms. Johnson told me that she thought that they would do better work with that arrangement, and she wanted them to enjoy learning about this topic.

In the open-ended survey, Luis was happy with this change. "Now with new parners," he explained, "I thick are proget is going to turn out relly good. Becueas we have lots of good informashin about the tribe that we are doing.and we have found lots of relly good facts about are progets.I thinck are proget is comeing out good we just need more facts about the shelter of are tribe."

On the other hand, Mallory complained about working alone, but she also noted that partners that did not do their share of the project were aggravating to her. "Well it's kind of hard when you work alone and it depends on the subject," she said. "Also it's depends who you work with. If he/she will sit back while you do all the work it frustrates me! Oh and also when he/she says I am going to do this but doesn't do it!"

Most of the students were working well together and commented that they enjoyed learning as they collaborated on their projects. The partnership of Mallory and Luis was the exception, and the only group that was split. Mallory was challenging for the students to work with, and she lacked some skill in negotiating responsibilities or sharing work. Luis, however, wanted to work with other partners, so he was not invested in making his partnership with Mallory work effectively. I observed that Mallory had some difficulties, and the students already had this perception of her as they entered into the online class.

Although Luis was happier now that he was working with his friends, Miguel and Alejandro, he was not as challenged to produce quality work with this collaborative group. Their research within their wiki was not as organized as the wiki developed by Nadia and Katie. They only included three entries, and these entries were not grouped according to the specified characteristics of the tribe. The following entries comprised their entire wiki:

Miguel: According to Hopi legend,the first people be created in a dark cave far below the surface of the earth.They climbed up through two more caves until they reach the ground.

Alejandro: Hopi people eat buffalo, squash, corn, bean, melon, pumkin, and fruit and where they live they live in northeastern Arizona and for there living they make there homes from bricks,mud,and was many stories high and if there house get in fire they get sand and throw it in the fire and for there clothing they wear manta , woven belt, and a white moccasin with a traditional wovenwearing blanket and if the girls did not want to wear skins they would wear a dress with flowers and paint and if they honored there god they would wear feathers, and animalskins.

Luis: The Hopi tribe is fond in northeastern arizona. They speack aztec language. The indian kids had many more chores and less time to play in their daily lives.Hopi women were in charge of the home and family.Hopi men were in charge of the laws and agriculture and war.

Luis had commented earlier that his group was still searching for facts about their tribe, and although they found facts, they did not seem to make meaningful connections to their work as many of these facts were just copied into their wiki. They stated within the open-ended survey that they learned from this experience. "This projet helped me a lot because we are working on the computer and geting some imformation and it helps me think a lot and all of that I remember in my head," Alejandro commented.

Miguel described his collaboration with his partners. "I told my group members if there was any mistakes as in grammer and if not than i corrected it myself. i also help my group by if

they needed a book about the places of the maps or Native of Amircans. That is all the stuff that did. Now I learn alot of stuff."

They asked Ms. Johnson if they could create a PowerPoint presentation rather than writing a collaborative story within the blog. However, I insisted that they write the story. I was concerned that they were copying information rather than connecting to it, and I viewed this connection as students interacting meaningfully with content. Writing the story was difficult for Miguel, and he explained in the open-ended survey that he preferred to present facts in PowerPoint presentations.

"Writting the storey was the hardist part of my projet i coud put facts in it but im better at power points," Miguel explained.

The directions for the story blog were as follows: *Use this blog to write your collaborative story about a day in the life of your tribe.* Based on these directions, Miguel, Alejandro, and Luis wrote this story:

> If i was a kid in the Hopi tribe I woud not have time to play but have to do chores all day. My dad was fighting in a wars. my mom was help me at me homes to help me grows into a warrior. I did chores all day and i never playd. I spok aztec and live in norteastern arisona. My mom said i was born ina dark cave below ground.. My family said that i climbd thru to mor caves to get on the ground. My mom said i was creatd by him.

In their story blog, they showed some synthesis of the information as they did describe what life would be like for a child in the tribe, but it mainly presented facts that they had recorded in their wiki. They had mistakes in mechanics that they were unable to correct among the three of them because none of them had enough skills to lead in that area. They needed a

group member, even if that member was not a friend, who had abilities that they could use in their collaborative work and who could model how to summarize information and write a story. Ms. Johnson had permitted the students to choose their groups based on their interests, and in this case, on their friends, but more strategic groupings needed to be considered based on the goals of the assignment.

The wiki and blog features of the LMS ideally presented an opportunity for the students to work interdependently as some students researched and other students entered the information within the wiki. Other groups divided up the information, like Nadia and Caitlyn, in order to complete the assignments in a timely fashion. Some students were unable to complete all of these projects within one week; therefore, I planned on continuing the work on the wikis and blogs during the next week while the students also began the next phase of the design. Although the students could view everyone's work within the OLC, we decided to use the wikis and blogs as the framework for a multimedia project that they would develop collaboratively with their groups. Namely, we planned on having them develop a digital story next week based on the story they had written in their blogs. I would also have to design some other activities for the students to complete after they had finished these collaborative assignments, so that the students could continue to learn new concepts.

Other students also commented on their collaborative work in their weekly open-ended surveys. "My favorite thing is that learning online makes everything more fun than learning from a book." Tommy explained. "We can also do a wiki or a blog. You cant do that in a book."

Elise predicted that her project would turn out well because they shared the workload. “It will be good because me and my partners are working really hard. Also I did the Wiki and the story blog. But thats because in my group I am the fastest typer.”

Denise also thought her group would do a great job on this project due to their teamwork. “My job was to search information on the internet, do my Wiki, and find pictures of the Inuit. I am also helping Janie write the StoryBlog.”

To advise her fellow students, Tonia gave this recommendation, “If you work by yourself you won't get a lot done. When you work as a group you get more done. Also you can have spare time to check. And to cooperate well, I wrote the wiki and blog of our explorer.”

There was more involvement in learning throughout the collaborative use of the wikis and blogs. However, the students were still copying many facts into their wikis, although they were summarizing their facts slightly more effectively, and some students were using the organizational structure of the wiki to facilitate this process. I noted that in their feedback, they mainly used the opportunity to collaborate to share responsibilities, but I wanted to see more evidence that they were constructing new understandings together rather than just working more quickly because they were dividing the workload.

I realized that the students were beginning to connect to the information as they pictured themselves as a tribe member or told the story from another point of view. This was just developing in the students and would need more practice and refinement so that they could synthesize factual information in this manner.

An Evolving Sense of Community.

Ms. Johnson and I were beginning to notice some differences in how the students were interacting in the face-to-face classroom. There seemed to be a dynamic relationship between the online and face-to-face environments. The students were learning more about each other through the online communication, and they were beginning to talk more in the hallways and play together more on the playground. They were discovering that they had many commonalities.

Students continued to choose to write in the Spring Break discussion forum from last week as they completed other assignments. I thought that this was evidence of a developing community since they were choosing to communicate online without being required to write additional posts. The students were beginning to be more courteous to each other in how they addressed differences of opinion within the on-going discussion forms, and some students began addressing students by name in their responses. I saw this as a subtle way of interacting with each other effectively within the OLC.

An example of this interaction occurred after Simone had discussed participating in soccer camp during Spring Break. Her friends had responded to her about their vacations when they were required to write their posts last week. In the following thread, some of the boys had started replying to her post:

Luis: I ddn't no you palyed soccer to.

Simone: I play every week. My legs hurt so bad from the strep and doing so much soccer! My week was boring but, i met some new people at soccer camp.So now i have so new

friends from soccer camp! Yay me!!!!! I guess I'm pretty happy about having new friends!

Alejandro: We always play during recess Simone.

Simone: I know but the girls don't.

Denise: I'll play soccer if Simone dos it too.

Simone: Ok! It can be girls vs boys!

Jason: OK!

They also began responding to posts with additional questions, which encouraged the student who wrote the original post to reply with an answer to those questions. This was another sign of student to student interaction. Although the students were discussing competing in soccer, there was additional interaction from the students that was beginning within the discussion forum and continuing onto the playground.

In the focus group interview, some students reiterated how their classroom was growing into a community through their online work. Phillip reflected, "I think it is more of a community, because when we are working as a class, everyone has a certain part. So each person is important. It's just like a community."

The change in the class was evident to Rianne because as she explained, "Now, the students aren't groaning when the teacher says it's time to work. It helps you to have a better attitude."

Within a focus group interview, Jason described the feelings of community that had developed within the classroom, “At the beginning when we didn’t have the online learning community, basically there were groups,” he said. “Do you know what I mean? Some people weren’t nice to others. There were groups of people, for example, who liked soccer who hated the people who liked football. There were groups, so we weren’t all friendly to each other.”

Maggie offered, “Because we’re getting used to all being together and talking together.”

Elise had learned that there is more to collaborative work than just enjoying being with your friends. She said, “I learned that you need to pick GOOD partners that actually do some work!!! Just because I picked a good partner that is good at not doing work. I'm not trying to be mean but it's true! But now I know to choose good working partners next time!!!”

When asked how she had helped out her group, she responded, “I've almost done everything!!! I did the Native american wiki and the storyblog. I hope that my partners will learn to work hard and not let me or another person do all the work.”

However, Elise did not want to change the Online Learning Community, “I wouldn't change it because I already love it soooo much! Cause you get to do all your work on ANGEL on your technology.”

Her partner, Samantha, did not share the perception that Elise had done all of the work. “I learned that if we do work together we can finsh work faster, “she explained. “When we do team work we can also finish other work that we need to finish. If one of us dose one thing one or more can do something else that we need to finish as a group. When we do one thing and one person dose another we can do ok.”

Elise's other partner, Kristy noted that Elise was difficult to work with, "Elise has to be pationt. Because it all works out better. We all have to do something we all agree on when we work together. We are all trying to do our best."

Reflection and Projected Modifications

Because of the continuing opportunities for online collaboration, the students were practicing and developing their own strategies for working together. This meant that sometimes they were able to successfully complete a project by dividing up responsibilities to save time or that they shared in the work, but some students regularly experienced conflict in this process. We also had to begin the week with providing a lesson in appropriate netiquette due to the issues that the students had experienced in their online communication. Two students had an obvious conflict instead of collaborating, and we had to break up their partnership. The teacher had to be responsive in dealing with these issues, yet they were not completely resolved within one week.

In retrospect, the lesson in netiquette should have been earlier within this investigation as a normal part of interacting and collaborating in a community of practice instead of waiting until the issues arose. Fortunately, we were able to address the issues with the students with the teacher's involvement and some design modifications. Because of the difficulties that the students experienced this week in their communication, I wanted more time for them to practice using their new strategies for netiquette by communicating in additional discussion forums next week. Again, I wanted to keep the discussions centered on issues that the students found interesting, yet attempt to make them more instructional. I would continue to have the class discussion forum as a required assignment in order to ensure participation. I also wanted to note if they had improved in the ways that they were responding to each other within their posts.

At the onset of this week's design, I determined four indicators for evaluating student engagement in collaboration. First, the students were to communicate and attend to the input of the other group members. Luis and Mallory had difficulty communicating and listening to each other, and Ms. Johnson ended their partnership. The other students had improved in this ability to communicate, and several students had noted that they had worked as a team. The second indicator was that the students negotiated responsibilities for the project's completion. The students did divide up the workload and observed that it made their work easier and faster. However, some students were also unable to finish the story blogs and wikis this week, so I needed to give the students additional time to complete those assignments before beginning the next phase of the project. Other students argued throughout this process, and Elise felt like she had to do more work on her project than her partners. Therefore, some students could use more practice with that strategy.

The next indicator was that the students organized their wikis with summaries of the information that they had researched. Most students had also improved in this area, and the wiki proved to be a useful tool for the organization of collaborative work. Some students were still developing their skills in summarizing information instead of solely copying facts into their wikis. The final indicator was that students were synthesizing the content they had researched into a story within a blog. This proved to be the area where the students had the most issues, and it was difficult for them to transfer factual information into another form of writing. It was also the most complex activity for them to complete as it required higher-level thinking, and I decided to continue working on this skill within the next week of the design.

I wanted the students to make more meaningful connections to the information they were learning in their collaborative work and research, and I perceived that developing a multimedia

project (a digital story) would help them in constructing new understandings of the content and in sharing that knowledge in new ways. I also wanted the students to create this project based on their story blog to encourage them to continue collaborating with their partners. Through this collaborative activity, the students would have to rely on the strengths of particular students to complete the assignment; therefore, they could practice and develop new strategies for interacting with each other. This project would be published within the OLC, and I viewed this feature of sharing work as another benefit of using an LMS. In that way, the students would be able to easily review each other's work and provide feedback that could be helpful in working on future projects.

Week Four: Interacting through Personal Connections to Learning Experiences

Design Issue Being Addressed

Last week the students collaborated in online research and posted what they had learned in wikis and blogs within the OLC. They had implemented the several strategies through this collaboration that facilitated their work, but they still needed additional practice to develop those skills more fully. Two areas in which the students needed to concentrate their efforts were on negotiating responsibilities for completing collaborative work and on making meaningful connections to what they had learned rather than on reciting facts. In order to continue to practice distributing responsibilities and constructing meaning through collaboration, I decided to have the students work together to develop a multimedia project, a digital story, based on their story blog on their Native American tribe or explorer, and this completed project would be published and evaluated within the OLC. Abrami et al. (2011) noted that generating multimedia work can help develop skills in motivation and self-regulation, and Chang et al. (2011) found

that online inquiry paired with an assigned presentation led to greater student satisfaction and academic achievement. This week, I wanted to observe if the collaboration that had begun among the partners would continue this week as they began another collaborative project that involved new skills.

Although the students continued to work on their collaborative projects related to the learning standards of Native American tribes and explorers, they also began to revisit some of the earlier elements of the design as they interacted with content. Throughout the previous weeks, the design of the OLC had gradually become more teacher-directed as a means of promoting greater interaction. Now, as the students acquired more capacity to learn within this online context, they began to choose to explore their own learning opportunities, and we followed the students in these explorations. Wenger et al. (2002) explained that as individuals begin to work together as a community of practice, they develop a body of common knowledge and established practices. They also construct a unique way of interacting with each other as they develop a sense of common identity.

In the community developing in this context, the students were also becoming more curious about the world through their online experiences, and this curiosity was evident as many of the students expressed interests in current events and discussed them within the face-to-face classroom with Ms. Johnson. I decided to utilize their interests in current events to provide them with a discussion forum to encourage this interaction. Therefore, as they chose to pursue these different interests in addition to their assignments, Ms. Johnson and I worked with the students to model, support, and facilitate these extended learning opportunities.

Overview of the Design

Some students were still completing their wikis and story blogs on Native American tribes and explorers, and as they finished those collaborative assignments, I had them begin working on a digital story based on their story blog that depicted a day in the life of the explorer or a member of the tribe they had researched. The students would have to use online resources to save photographs or illustrations to use in their story, and then they would also have to narrate their stories. Although the students had requested this type of multimedia project and more opportunities for collaborative activities, the main purpose of this assignment was to encourage the students to continue to develop strategies for negotiating responsibilities and to construct meaning as they synthesized their understandings with new information. In this way, the students could demonstrate what they had learned in a new way. Having the students create digital stories would require additional collaboration and interaction among the members of their group as they utilized different modalities to represent their learning. This would enable me to see if they were able to sustain the interdependence they had developed while they were working on their previous collaborative projects, and it might compel the students to utilize the particular skills of different group members. To publish these projects, I developed a dropbox, that we called *Our Project Dropbox,* within the *Our Community Projects* folder in which the students would upload their completed digital stories about their tribes or explorers. I also developed a discussion forum within that folder so that the students could provide feedback to each other about their digital stories and called it *Feedback on Our Digital Stories.*

As students finished the above projects, they also began working on earlier assignments that had been included within the OLC. These topics were usually self-selected based on students' personal interests that they wanted to share with the rest of the class. They were not

required; rather, the students chose to explore their interests independently. Not only did this pursuit demonstrate motivation and self-regulation (Abrami et al., 2011), but it also helped to develop the online community of practice as the students were introduced to ideas and strategies in learning from their peers and community members (Wenger et al, 2009).

During the period of this study, three major global issues had also occurred, and the students were discussing these topics in the face-to-face classroom, and much of their exposure to these issues was happening through their online research. These topics were the Royal Wedding of Prince William, the earthquake in Japan, and the war in Libya. To facilitate this interaction and communication about these topics, I developed a discussion forum on current events within the OLC. Furthermore, this spontaneous design modification, arising from the needs and interests of the participants in this context, provided students with an opportunity to interact while addressing their English/Language Arts standard to produce informational writing including the supportive use of online materials.

To scaffold this student interaction with informational content and each other, I created a folder within the OLC to assist student exploration of current events and titled this folder, *Current Events and Resources.* In that folder, I included a link to *TweenTribune*, an online news site intended for students at this age. In addition to reading current news stories on that site, students could also comment on the articles and submit their own stories and photos. I designed a discussion forum called *What interesting things are happening around the world and what affects are they having?*, so the students could discuss the issues they read about online.

Desired Goals/Outcomes

There were two goals for this week's design within the OLC. First, I wanted to have the students to continue developing their skills in online collaboration and interaction by designing a multimedia project in their small groups. This multimedia project would be a digital story based on the story blogs they had written that depicted a day in the life of a Native American tribe or explorer that they had researched. I hope to achieve the following two outcomes from this goal: (1) that the students would be more proficient at negotiating responsibilities for their work with the other members of their group and (2) that they would make meaningful connections to the factual information. Some indicators of successfully negotiating responsibilities for work would be the completed digital stories, observation of student cooperation, and student responses about accomplishing this process of collaboration. Making meaningful connections entailed that they were able to synthesize what they already knew from previous experiences with new information they had learned from their research. In a digital story, this synthesis would most likely involve the incorporation of the basic elements of a story (characters, plot, and setting) with the characteristics that were relevant to their particular tribe or explorer. It could also include particular design elements (such as the narration, music, transitions, and illustrations) that they chose to include in their story to express the factual details. These stories would be published within the OLC so that the project would have an authentic purpose, and the other students would provide online feedback about each group's work.

The second goal for the design was to encourage more independent student-to-student interaction within a discussion forum based on current events without the consistent input of the teacher. In the second week of the design, the students had demonstrated that they were engaged in social discourse within the Spring Break discussion forum, and last week they had learned

about the appropriate netiquette that should be utilized in online communication. I decided that I would require participation in this discussion form, but Ms. Johnson and I would refrain from responding to the posts to see if it was still necessary for us to post within a discussion forum to sustain the interaction. Based on what I had learned in earlier design phases, I chose this topic because the students were already showing interest about current events in the face-to-face class, and I wanted to observe if they would interact with each other about this more academic topic. By developing activities and discussion forums on current events, I hoped that the students would be able to interact more within the OLC because they would be motivated to explore relevant issues with the input of the rest of their learning community.

Results of Implementation

Interacting from the Periphery of the Community.

Last week, Mallory had conflict with her partner Luis, and so she worked alone on her projects about the Pawnee tribe. After she had written her story in her blog in the OLC, Mallory asked for help in using the software, *Photostory*, and wanted to know what to do with the pictures once she had found them online. There were students in the classroom that knew how to do this, so I had them show her how to create the project. She listened to Bryant's directions only long enough to know how to save and import her pictures that she had found, and then she quickly left to do the rest of the work by herself.

She asked me to read her story on the life of a Native American from her tribe, and in her online story, she tried to illustrate the daily life of a girl her age in her Pawnee tribe. An excerpt of her story is included below, and the complete story is included in Appendix K:

> Hi, my name is Uka. I'm only 10 yrs.old. Today I'm going to tell you about me and my tribe. Let's start out with the children and me.
>
> We have alot to do and the parents have like one job they each have to do. The children have to do the rest, but the moms also help us if its really hard to do. The girls have to pick the berries, weave baskets,and serve the food. The older boys have to hunt tiny animals. The younger men hunt with the other men. And the women cook and take care of the little kids and babies.

As I read the story, I thought that she summarized the facts about her tribe well. The main character that she had created was a girl close to Mallory's age, and Mallory seemed to connect to her. This connection illustrated her interaction with the content that she had researched because it seemed that she was really visualizing herself as a member of that tribe. I made the suggestion that she could provide more action involving the main character in her story by developing a plot to her story. I observed that she wanted approval of her work, and I didn't want her to feel like she had done something incorrectly. Normally, a student would collaborate with a peer to review, revise, and edit a story, but because of Mallory's behavior in earlier activities, she had to work alone on this assignment.

I originally worked with Ms. Johnson to arrange the students into groups for their projects, but because of her conflict with Luis and his desire to work with his friends, she had to work alone. Mallory was unable to share responsibilities with him, and when they disagreed about the work, she became frustrated. It was upsetting to her that the Luis couldn't meet her level of expectations, and she was impatient with him. Although Mallory had conflict with the other students, she was still able to interact with them through her online discussions. At one

time, her desk had been separated from the other students and was against the wall in the front of the room where she couldn't see them because of her frequent face-to-face conflicts with them. In the OLC, on the other hand, she was able to interact with others in discussion. By reviewing her story, I noted how well she had connected to the content that she had researched, and because her work was being published within the OLC, she had the opportunity to share it with her classmates. However, we had to monitor some of her online activity due to how impulsive she acted when she was angry.

Mallory was able to be fit into the online class because she was able to comment on other students' work and communicate with them without having that frustration of working with them face-to-face. Also, because her work was of high quality, the students were able to learn from her projects that were posted online. Online learning helped her to become more involved in the class even though on her group project it was very difficult for her to consistently collaborate with someone else. Lave & Wenger (1991) described the concept of legitimate peripheral participation in which some members of a community learn from observing the central work and interaction of other members of a community. In this online environment, Mallory could interact from the periphery of the other students in the class and asynchronously through discussion forums but without actually having to construct a project with them.

Publishing Student Collaborative Projects.

After the students completed their digital stories about their Native American tribes and their explorers, they uploaded them into the OLC to share them with the other students. When the teacher had the students present their stories to the class, she had them play them over the IWB at the front of the classroom. I also created a discussion forum within the OLC and

required the students to provide feedback about the stories to the groups while the projects were being presented. Not only did this provide them with another opportunity to interact online with their peers, but it also caused them to attend to and learn from each other's projects.

Although the students' projects varied as far as the production qualities (the recordings, pictures, and transitions), overall, they had collaborated effectively together to create these multimedia presentations. Actually, for having worked alone, Mallory also had produced an effective project even though her audio was somewhat difficult to hear. She had added music to the background, and her narration was muffled by the sound of the music. She had, however, timed her illustrations (some hand drawn) to align with her narration.

Phillip and Eva had collaborated to produce their digital story and had posted it within the OLC. However, when they proceeded to present it to the class, their audio was not working. They had to improvise by reading their script aloud during the video of their photos and illustrations. The students, however, had become more effective at providing constructive criticism due to the lessons on appropriate netiquette and practice in online communication, and the following feedback illustrated how they had improved in these areas:

> *Rianne:* I think that your project was good but you needed to put in everything the teacher told us that we needed to put in. For an example I know you thought you put sound in but it really didn't work. I kind of feel a little sad for you but all of your pictures where great and all though.

> *Kristy:* I like your project cause I learned new things when you did the presitation. Your sound didnt work but the project was still good because your pictures were good.

Candi: Well your group did a great job. But you still have some things you need to improve on. Remember to add your sound before you make the movie.

The following story about the explorer Juan Ponce de Leon was written in the story blog and narrated in the digital story by Jackson, Tommy, and Jason:

> It is a breezy morning on the voyage to Bimini the boat going from side to side. The more breeze there is the more I can't believe that this voyage to the fountain of youth was accepted by the king and his royal mistress. March 29, 1513- There is a storm on the bow it looks bad enough to destroy our path. The storm has got to us it is tossing barrels around people going insane the weak pounding the weak till there bones break I scream my name at the wind in my defiance. March 30, 1513- The storm passed, but the madness of the crew didn't back down it grew and grew. I thought if it continues I will be the only one on the boat, or worse I will become one of these beast. April 2, 1513- It is a breezy morning, but I find something that caught my eye finally sweet glory land as I announced this island will be called la Florida. After a while we decided to search Florida. February 20, 1513- We are finally back in Puerto Rico even though I made a heroic discovery on Florida I am not the only to have seen the glory sight of the Bahamas.

The goal for designing this project was to continue developing the students' skills in online collaboration and interaction, and I determined that the two main outcomes aligned to this goal were for the students to negotiate responsibilities for the work and to make meaningful connections to the information. To assess how effectively the students negotiated responsibilities, I highlighted three indicators. The first indicator was that the students published a completed story, and these students had narrated their story, selected illustrations to support the

text, and published it as a digital movie file within the OLC. For the second indicator, I observed that the students had different responsibilities as they wrote the story, selected the illustrations, and all three of the students recorded themselves reading different parts of the story. Even in their responses in the open-ended survey regarding their contributions, they noted that they were successful in negotiating responsibilities, although Tommy had to struggle to keep Jackson from doing all of the work. Jackson even developed a game to teach Tommy and Jason the information about Ponce de Leon.

> *Tommy:* The grup taught me to do teanwork caus I was not going to let Jackson do all the work and just sit there. That would be nothing but lazyniss.
>
> *Jackson:* I did a lot of the blog and I did some on the the photostory. Plus I tried to help Tommy and Jason by making a game so I know that they learned too. Tommy won but Jason learned a lot any way.

Jason described how his team collaborated as I followed up with him in the focus group interview. "It has helped us understand what we think better," he explained. I was better at researching; they understand that. Then we figured out Jackson was better at typing and better at writing down. Tommy was better with the technology and doing the photostory. That's how we worked it out."

In the focus group interview with Jackson, he noted how this collaborative work extended into their personal relationships. "It helped in the best way," he stated. "Like, when you have different groups, like me, Jason, and Tommy. We never used to be friends because we've never really been in the same group. But now we're in the same group and we learned more about each other."

I observed that the students in this group had also made meaningful connections to the information through their digital story. They had modified the directions to fit how they wanted to construct their project. They were directed to describe a day in the life of their explorer; however, they chose to modify those directions on their own, and wrote a journal of several days from the experiences of the explorer. Their digital story contained all of the basic elements of a story, and they incorporated factual information as they related the experience from the point of view of the explorer. Finally, they included transitions within their video and narrated the text of their story with effective expression.

The other students also noted the collaboration of this group within their feedback in the discussion forum:

Denise: You did good work in your photostory I think the sound coud be better but it was intresting.

Bryant: It was a great story how you told about the explorer I think you had facs that made me understand.

Aaron: Your group did a good job and you worked good together.

Rebecca: I like how in your grup it seemed like eveybody piched in to do the work.

In commenting about these collaborative projects, the students were enthusiastic about the assignment. Tonia explained how she learned during this assignment, "I like that we have been doing the presentations. I learned about how to do the projects online. I also learned about history while doing it online. I like doing it in a group because we can get more things done faster. It is also easier."

Phillip did not seem upset about the sound not working during his project. He responded, "The project really helped me alot to pay attenchen to what we are learning. Sometimes it helped me behave in class.I do better when I work with other kids. Even when we messed up."

Eva, however, was more upset about her work on the project. "It was fun to work on the project but I wish we jest had better sound. I was embarased that our project messed up. Everyone said nice things but I wish it was better."

The students had high expectations about the quality of their projects, but this was a new way of presenting information for most of them. They had to learn new skills to assemble all of the different elements while interacting with a partner. Publishing the digital story within the OLC, made the project more authentic; moreover, the students had an audience reviewing their work. The students were effective in their constructive criticism, and I noted that they suggested specific strategies for improving the digital stories. There was broad scale participation since it was a requirement, but a benefit of requiring participation is that the students were obliged to reflect on the projects that were presented.

Interacting about Current Events.

As the students completed the research and activities about current events, they continued interacting with each other. This study occurred in the weeks following the Tōhoku earthquake in Japan, and one of the students in the class, Bryant, was originally from that country. Many of the current events in the news were about that earthquake, and since Bryant's grandparents lived in Japan, it made the issue even more relevant to the students as they discussed current issues in the OLC. Because Bryant had this personal connection to a tragic catastrophe in another country, he was invested in learning everything he could about that event by conducting online

research. This interest encouraged the other students to begin discussing the earthquake in Japan in the discussion forum within the OLC. I have included a thread from this discussion forum in Appendix J.

Many of the students discussed how they could help the victims of the Japanese earthquake and suggested ways that they could help raise money to donate to the Red Cross. "I feel so sorry for the people in Japan because of the earthquake that happened there," posted Katie. "I think we should have a festival at our school to make money for them and we can send it to help the people build new homes too."

Some of the students also mentioned Bryant and his family in their posts. "Im worried about Bryants grandparents in japan. He says their OK because he skyped them with his itouch."

The students were sensitive about the issue of the earthquake in Japan because they were more connected to the tragedy through their connection to Bryant. They mentioned Bryant by name in the post, and they were more sympathetic to the needs of the Japanese people. It was a topic that was a concern of many of the students. Here is another thread of discussion about Japan:

> *Simone:* I think we should we should talk about what happened in Japan its really bad. If feel bad for the people in Japan. I think we should help them instead of sitting around. Don't you think we should help the people in japan? It would be nice to help them too.It's bad what's happening to the Nucliar powerplant. First there was a bad earthquake. Then, there was a bad tsunami.Which is really bad so many things are destroyed!!!
>
> *Candi:* I think it is great you are trying to help japan in their time of need. How can we all help?

Simone: Dear Candi, The way we can help Japan is by donating money to the American Red Cross.So they can send that money to Japan. It's a Big Tradegy. Did you know that Japan had there earthquake was really strong? It was 9.0 almost the strongest earthquake. The strongest is 10 that's the strongest there can be. But Jackson said it was 9.4 but i'm not sure. Sincerely, Savannah

Jackson: Simone, I really agree with you, but do you know that in Libia their leader is killing the civillians and the french, british, and american armies are tring to fight his forces?

Simone: Dear Jackson, That's sounds really bad.They both aren't good things. I agree that what's happening in Libia is bad. They both need help! Both disasters sound Terrible. It's like Call of Duty for Libia just in real life! Which I agree is really bad. I'm not saying I don't agree or anything. Sincerely, Simone

I observed how the volume and insightful quality of the above posts illustrated the higher level at which these students were interacting. Furthermore, they were consciously trying to address each other appropriately and to be sensitive about how they would react to their statements. Also, I noted the netiquette the students were attempting to utilize in their online discussions. They were kinder in how they addressed each other and supported each other's opinions while they also effectively addressed their own concerns about these issues. Even when Jackson brought up a different current issue than what Simone had addressed in her post, she reassured him in her reply that she was agreeing with him that both situations were "really bad." This development of appropriate interaction was another step toward developing the community practice as the students became more comfortable in communicating.

Jackson noted in the focus group interview: "The OLC makes it where we can communicate with our friends and neighbors. Here we can say nice things. We don't bully each other, and we're not mean. Well, if you're on Facebook at home, sometimes people are mean and say bad words and cuss. People do that, but in here it is like a nice, good place to talk to other people. It's safe."

Interacting with the Teacher as a Learner.

Even Ms. Johnson wanted to share her interests with the students in the classroom. This pursuit of interests created a dilemma within this standards-based classroom as the teacher and students brought their personal interests to the classroom, and the teacher wanted to utilize these opportunities for teachable moments. These situations created the foundation for additional interaction and collaboration among the learning community. In light of this situation, Ms. Johnson had to determine how to relate these current events and personal areas of interest to the performance standards for fourth grade. However, there are standards within every grade level that address research, informational writing, reading a variety of sources and communication skills, so the online interaction and discussion was a logical method for practicing these skills.

This was an opportunity to explore new ideas and topics together, so we had to set aside time for those endeavors as well as to work on the collaborative projects related to Native American tribes and explorers. Ms. Johnson posted links to online activities related to the Royal Wedding within the OLC. The students worked on these activities as they had time after completing their assignments related to the unit on Native American tribes and explorers. Then they completed their activities on the royal wedding and posted their work within that folder in the OLC.

We negotiated time for the students to spend on the royal wedding projects, and Ms. Johnson continued to explore ways to connect this study to standards. However, we also managed to plan time for the students to work on their digital stories on tribes and explorers. Ms. Johnson wanted to watch some of the royal wedding with the students that she had recorded, so she decided to have the students eat lunch with her in the classroom to watch the recording of the wedding. That would enable her to use her class time to have the students work on the digital stories for their projects.

As the students were interacting and developing a stronger sense of community identity, Ms. Johnson was also becoming part of that community. She wanted to share her interests with the students and have them respond to her with their work. Providing the time to build the community with the students changed the quality of their interaction, as Ms. Johnson began encouraging the students to make more choices and explore new learning topics. In this manner, they began interacting with their teacher as another co-learner who was excited about sharing her interests with the students. A community of practice is a group of people who share an interest or a passion about a topic, and through their ongoing interactions, they develop more expertise about that topic (Wenger et al., 2002). As the participants in this emerging virtual community of practice began establishing the norms for how they interacted with each other, they also began sharing more of their personal interests.

Many of the students described that they had developed an interest in the Royal Wedding after Ms. Johnson had introduced that topic to the class. According to Denise, "My favorite part about the Online Learning Community is when Ms. Johnson or Mr. Clark tells us something new and we learn a lot more about what is happening each day like when we learned about the Royal

Wedding and we did lots of fun activities. I like it because we learn new things and you just want to learn more about it."

Interacting through Personal Interests.

As the teacher began modeling the sharing and learning of personal interests within the OLC and the students continued discussing more personal topics and experiences, several students wanted to explore more avenues for personal learning. Some students had completed their collaborative projects and also had time to conduct individual investigations about their interests. Again, this was another benefit of the asynchronous nature of working within the LMS. Students could continue learning new information in a self-directed manner while other students who required additional time to complete their assignments could continue to work on their assigned projects. In this way, the teacher was better able to facilitate more effective differentiation of assignments and activities based on the students' needs, abilities, and interests.

With their newly found skills with online research and the use of the LMS, they were now ready to use the first discussion forum that I designed in Week One, *My Personal Learning.* Janie chose to return to that forum from the first week for this activity. I had assumed that the forum was a failure, but I realized as Janie began publishing work in that forum, it just took more time for her to feel skilled and comfortable enough to begin posting about her interests. Janie had collected some caterpillars in her yard and kept them in a jar with some food. She emailed me within the LMS to tell me that she had found the caterpillars and that they were starting to make cocoons. She then posted in the *My Personal Learning* discussion forum about having the caterpillars to the other students, so I suggested that she take a picture of them with a digital

camera and share that photo in the discussion forum. She took a picture of them with her Nintendo DSi and returned to school that week with the pictures loaded on that device.

The other students in the class wanted to see Janie's pictures of the caterpillars in their cocoons, so we had to research how to take the pictures from the DSi and load them into the computer. We learned how to copy the pictures from her SD card and uploaded them into the discussion forum of the OLC. Within the discussion forum, she had to use the HTML editor tool to insert the images into her discussion post (Figure 8). The students who were interested were then able to discuss the photographs with Janie, and she could continue to add more pictures to document the development of the caterpillars.

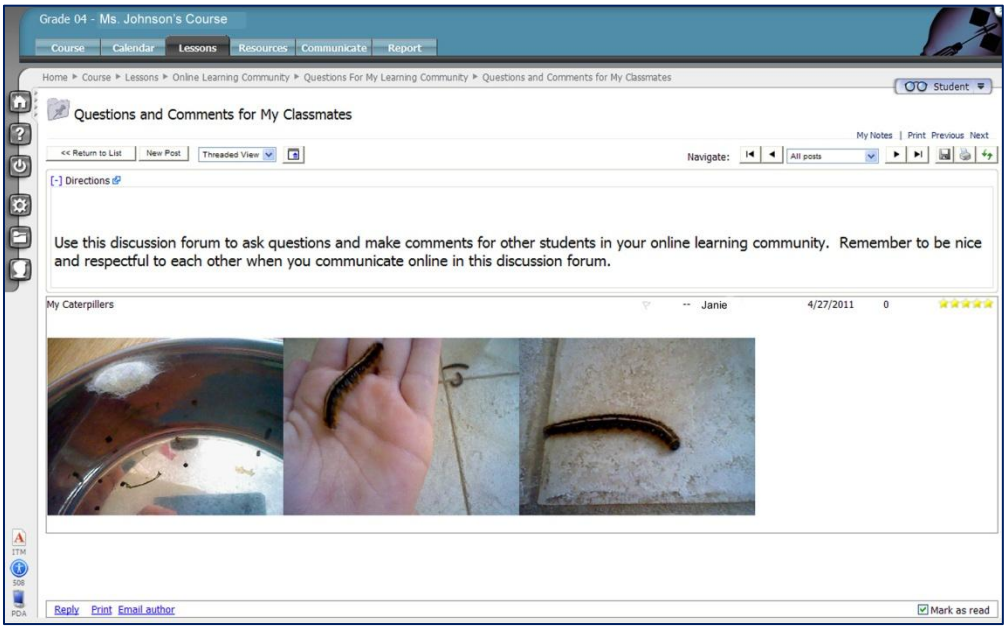

Figure 8. Caterpillars Discussion Post

Janie then went into the *Technology Tools Discussion* folder located within the OLC and then into the *How Can You Learn With a Nintendo DSi* discussion forum to explain the steps she had learned about uploading photos to the LMS to help the other students. When they saw her

work, they were eager to reply to her post, but they were also eager to try to upload their own photos to the discussion forums. The following responses were made to her posts:

Candi: I like your pics of the catapillers! I never thought you could do that with a dsi.

Nadia: Good photos, but I don't know if I would touch the catepillars.

Another forum that began to be utilized during this phase of the design was the *Questions and Comments for My Classmates* forum. Again, after students developed more skill and established their practices for interacting and collaborating with each other, some of them returned to this earlier forum to begin asking each other questions. Jackson was particularly interested in asking questions of his classmates, as in the following post:

Jackson: Guys, the year is almost over and before then I'm going to ask you guys a question every week, so here is your question of the week. When did World War 2 start?

Phillip: It started in Sept.1939.

Robbie: World War II started in 1942 when the japinese dropped bombs on U.S.A Pearl Harbor. So we bombed them -twice. Nagisaki is one of them. I WIN this week!!!!

Jackson: Hey guys thank you Robbie and to Phillip who replied to my post and the correct answer was 1939.

When asked about personal learning in their weekly open-ended surveys, many students were positive about these forms of interaction. "I think they're really fantastic!" exclaimed Eva. "All the new ways are really great! Like how you put photos on your posts. I would like to post a picture of the royal wedding. I'm excited to see the other new changes to ANGEL."

Jackson also wanted to continue having a question of the week throughout the summer. "I think there probably a question of the week thing for summer like 6 students in the class should make a question every week and like one will be on math the other art (social study) science language arts history and music (history)," he said. "The reason I want that to be a thing added to our community so during the summer we can keep in contact."

It was important to encourage this motivation for learning although the topics were not always related specifically to content standards that the students were currently studying. However, the students were demonstrating the qualities of a virtual community of practice in that they were utilizing technology tools and skills (Dubé et al., 2006) to establish a virtual collaborative space in which they connected about their interests. Furthermore, an outcome of online learning is that students become more self-directed learning and motivated to interact with each other and content in order to sustain the learning process (Abrami et al., 2011), so in following that reasoning, the students were more likely to continue learning about the standards as well as their personal interests through this developing interaction.

Reflection and Projected Modifications

The students were requiring little intervention from either Ms. Johnson or me in order to complete their assignments. They were still curious about many concepts, and during this week, the interaction within the OLC became personalized as the students began investigating their own interests. Several times I had students email me for assistance with their personal devices or to tell me additional things about their personal learning. I observed this as evidence that they were frequently interacting and communicating online especially about real concerns that were important to them. Exploring topics of personal interest provided authenticity to the ways that

students were interacting with content, and this exploration led to additional interaction among the participants (Abrami et al., 2011). The teacher was also developing into a more facilitative role in the virtual community of practice as she became more active in nurturing and initiating the interaction and collaboration that were occurring within the OLC. Apparently, the excitement of sharing personal interests, like Janie with the caterpillars or Tommy with fishing, was a trait that Ms. Johnson also shared.

The desire to share their personal interests had come from a sense of community that had developed within the OLC. The students were feeling safe and comfortable within the online learning environment due to the emphasis on appropriate netiquette and the establishment of appropriate norms for group interaction. Likewise, the OLC had become more collaborative as the students understood their responsibilities for their group projects. We had developed situations in which the students interacted with a partner and in small groups, and now, I wanted to practice some ways that the students could interact and collaborate on whole-class activities and projects in the final week of the design.

Since the students had been studying the characteristics of various Native American tribes, I decided that to extend that learning into a simulation. Winn (2002) explained that computer simulations allow students to participate collaboratively in an online activity that could not be effectively replicated in the real world. Chang et al. (2011) found that this type of interactive assignment led to improved student satisfaction, degree of participation, achievement, and learning performance. In the next week, I planned on having the students design their own tribe based on their research of Native American tribes, and we would integrate the study of explorers by describing what would happen if a group of explorers found the tribe and interacted with them.

Designing this tribe and its traits and characteristics would involve the collaboration of all of the students in the class since they had each developed a particular expertise about a specific tribe. Therefore, they would be compiling the new information that they had learned in order to design their community tribe within the OLC. I also planned on practicing synchronous discussion with the live chat function of the LMS to facilitate this design. This would also introduce a new tool for communication and collaboration among the students, and I wanted to observe that interaction to see how they were maintaining appropriate netiquette.

Week Five: Interacting via Synchronous Discussion and Community Collaboration

Design Issue Being Addressed

Throughout the study, we practiced the strategy of asynchronous communication to develop interaction among the participants; in this stage of the design, we explored the use of synchronous online discussion with the live chat feature of the LMS as another form of interaction. This feature required more risk for the teacher and responsibility for the students because if a student wrote an inappropriate comment, it would be immediately received by everyone within the synchronous discussion.

Now that the students had developed more skills in collaborating with each other in small groups, another design issue for this week was how to extend the learning of the students with a simulation that required them to consolidate all of the disparate pieces of information and content into a cohesive project. In this process, all of the strategies involved in online collaboration and interaction that had been employed throughout this study would have to be utilized. This process could assist the students in developing a sense of closure with the input of everyone within the OLC.

Overview of the Design

I turned on the Live Chat feature of the LMS. Most teachers did not utilize this function with students because it was difficult to monitor what they would post synchronously. For the final community project of the unit, I had discussed with Ms. Johnson that the students could utilize what they had learned about Native American tribes and explorers to develop a simulation of a tribe who encountered a group of explorers. The students could collaboratively decide on the elements of the tribe's culture including the environment that they lived in as well as how they lived within that environment. This planning would include the types of food that they ate, the homes they built, and the clothes they wore. I thought that using the Live Chat would be an effective strategy for student interaction and collaboration in designing the tribe.

I developed a folder called, Our Community Tribe, in the OLC to contain all of the information that the participants developed about the tribe. I moved the link to the Live Chat about the Online Tribe into this folder and also created a discussion forum called, "How should we design our tribe?" Before beginning the Live Chat, the students posted their ideas about the characteristics of their community tribe based on what they had learned from their projects on Native American tribes. Then they participated in the chat session and used their ideas posted in the discussion forum as a guide for the session.

Ms. Johnson used the discussion forum and the results of the chat session to organize the final design of the tribe. Through participation in the discussion forum, the students developed the name, "Johnsonian Camp." She then had the students brainstorm categories related to aspects of life within a tribe. Their list included the following: clothing, shelter, food,

beliefs/customs, tools, resources, setting/geography, and daily living. She entered this list within the OLC.

She then developed a blog within the Our Community Tribe folder. She called this blog, "Our Tribe Blog – Johnsonian Camp." She had the students work in pairs to write detailed information about each of the categories that they had listed about life within a tribe. Each pair of students volunteered to write more about one of the categories. Directions for the students in the blog are included below:

> Welcome to our tribe – Johnsonian Camp!
>
> This tribe is made up of 25 young ones and two wise leaders. Now you have entered the great Johnsonian Camp, and our members are the Johnsonians! In this blog we will share all about our tribe, including what we wear, eat and do. We will share our beliefs, customs and culture. We will also describe our shelter and tools for daily living. You will learn about what resources we use to survive. Each member of the tribe is an expert about a particular part of the life of the tribe and will write about their areas of expertise in this blog.

Desired Goals/Outcomes

The goal of this week's design was to facilitate the interaction of all of the students as they collaboratively developed the community tribe from the information they had learned throughout this investigation. By working with the members of the learning community through the synchronous live chat, I was anticipating that they would feel a sense of belonging and accomplishment in the development of their community tribe. I was also hoping that the

participants would be able to identify benefits to their learning as a direct result to their involvement in their online learning community.

I also wanted to have the students develop a sense of satisfaction and closure as we completed the unit of study on Native American tribes and explorers. As a culminating activity, I decided to have the students participate in a simulation by creating a tribe based on what they had learned through their study of characteristics of Native American tribes, and we would include the interactions they experienced as they were discovered by explorers. This would cause the student to utilize the understandings they had constructed about Native American tribes and make connections to that information as they related it to themselves within the simulation.

Results of Implementation

Synchronous Discussion to Construct Meaning.

To develop the community tribe, we used synchronous discussion to collaborate on its design. The synchronous discussion occurred via the Live Chat function of the LMS. I facilitated the discussion of how we should develop the simulation of the tribe, and it was difficult to have the different students participate in collaborative decision-making as they were suggesting ideas simultaneously. This work demonstrated that it was very difficult to arrive at consensus when the group became larger. However, the students noted that they had grown into a closer-knit community during this study and discussed the closer interpersonal connections that they had made.

When I began the Live Chat, I asked the students how they thought they should design their tribe. Jackson was the first student to try to discuss the design of the tribe, and he suggested that it should include things that they all knew. I redirected the students a few times at the

beginning of the session, but as some students began discussing the traits of their tribe, more of the students became involved in the discussion.

Katie said that the name of the tribe should be something that starts with Johnson, and Simone thought that the tribe should be in a place with a warm climate. Jackson built on that idea and recommended that the tribe should be "coastal-themed." Aaron agreed and thought that the tribe could fish for their food to survive. The students decided that there would be 18 members of the tribe, and a group of seven explorers would discover them.

While the students were chatting together, I tried to facilitate their development of their ideas and to help keep them focused on their task. In this excerpt of conversation from the Live Chat, there is evidence that the students are building their ideas together:

Jackson: I could be the explorer, Juan Ponce de Leon.

Tim Clark: That's really cool, Jackson. We could have the fountain of youth in the middle of our village, and Ponce de Leon is searching for it.

Jackson: Yeah! I know it is total success.

Samantha: We can also have two of the explorers to meet.

Candi: We should live in tepees. Georgia has good farming land, so there is no need to move around a lot.

Aaron: Yeah, that's really good Jackson!!!!!!!!!!!!

Tim Clark: That's right, Samantha. The explorers could meet. They could be from different countries like maybe England and Spain.

Jackson: Candi, tepees are for moving around.

Aaron: That's real good Candi.

Katie: What is the fountain of youth?

Samantha: We can have most of the land full of crops.

Jackson: Not for staying in one place.

In the Live Chat, the ideas developed collaboratively throughout the discussion. In the above discourse, two ideas were considered as different threads in the conversation. One thread was focused on the subject of the type of housing that the tribe should construct. Candi recommended teepees, and her sentence following that recommendation showed that she was probably confused about when tribes used teepees. When she said that since Georgia has good farming land, so the tribe should use teepees, Jackson noticed that her logic was faulty. He reminded her in the discussion that teepees are for moving around. However, Candi brought up the idea of crops that Samantha reiterated later in the discussion.

Meanwhile, the second thread of the discussion was about the explorers that would become part of the simulation. I tried to encourage this discussion through my posts in the chat session. Jackson had brought up the topic of Juan Ponce de Leon, and I wanted to follow up on that train of thought to develop that aspect of the simulation. I also mentioned the legendary Fountain of Youth. That spiked Katie's interest, and she asked about the Fountain of Youth later in the session. Samantha was also discussed the topic of the explorers, and she suggested that they meet each other during the simulation. I again tried to reinforce her work within the discussion forum by responding to her post.

Students assumed different roles as participants in the discussion. These roles were similar to the types of roles the children had developed within the OLC. Both Simone and Jackson were able to participate simultaneously in both threads of the discussion. The other students usually followed just one major idea or concept. Jackson was not concerned about directly correcting Candi when she made a mistake in her logic. However, Aaron was always cheering on the other members involved in the discussion. He was able to recognize students who attempted to make suggestions, and he was supportive of those efforts through his comments. Katie, meanwhile, was the only student who asked a question instead of giving other facts. She asked about the Fountain of Youth in response to my post, and I wondered if she would have asked a question of another student if they had mentioned something that she did not understand.

This collaborative activity could not have been accomplished so quickly were it not for the Live Chat feature of the LMS. In this way, the students were able to develop and dismiss ideas quickly and feel as if they had all participated in the formation of the tribe. It also caused them to practice another type of communication that is better conducted online than in face-to-face as they were able to rapidly interact with their peers with an adult facilitating the process. In this way, the activity utilized the interaction that had developed throughout the study, and without the prior weeks of interaction within the OLC, the students would not have been prepared for this feature.

Collaboratively Designing the Community Tribe

Because of the speed with which the synchronous discussion occurred, I was concerned that some students may not have had enough time to participate effectively in the design of the

tribe, mainly due to language differences. Consequently, I made a spontaneous design decision and developed a discussion forum that I titled, *How should we design our tribe?*. Then the students also worked on designing the tribe in the online discussion forum. In his post, Luis said, "I think we should design our tribe like this. The people that did a Native American tribe can be the tribe they studied like the Inuit or the Hopi or one of the other tribes. Then we can make a big tribe with the whole class and we can interact with the explorers, like one of the explorers wanted our land so we could speak a fake language with the explorers. Then they would not understand what we are saying so they would not take our land."

Candi wanted the community tribe to be more representative of the climate they were already familiar with in Georgia. "I think our tribe should live in a warm climate," she posted. "They should live in Georgia, so we would know a lot about the climate and surroundings. If they do live in Georgia, they would have great farming land so there would be no need to move around a lot. We also need to know their culture and we should do research on the tribes that lived in Georgia. What do you think?"

Simone responded to Candi's post, "I think we should also live in a warm climate like you stated in your message because we live here in Georgia not in Alaska. It should be a tribe that lived here in Georgia so you are completely right on that." In this way, the students discussed their opinions and tried to arrive at some consensus. Eventually, Ms. Johnson had to facilitate this consensus-building with the students.

Ms. Johnson and I discussed whether or not the students should be encouraged to be imaginative about how they developed their tribe and include their personal experiences into the tribe's design or whether the tribe should be based solely on factual information from their

research and projects on Native American tribes. We decided that the students could choose however they wanted to build their tribe, and the resulting tribe ended up merging what they had learned about the past with elements of modern conveniences.

For example, in the description of the shelter, the students wrote the following:

> Welcome to the Johnsonian Camp shelter! Here you will learn what resources we will use to build our shelter. We will make a big house so everybody in our tribe can fit in it. Everybody will have their own room. The houses will be made out of glass and wood and so will the balconies. We will have curtains made out of leaves and sunroofs made out of pine straw. Our shelter will be near the ocean. We will have a hot tub and pool made out of plastic and glass in our backyard that will be 3 acres long and 2 acres wide so everybody can play on it and even invite some friends over. On our balconies we have a pulley to put food in it and pull it up.

After the students had finished describing the various characteristics in the tribe's blog, Ms. Johnson had them use the program, Pixie (software for creating illustrations), to depict those characteristics through computer drawings. For this activity, she took the students to the computer lab since everyone would need to have the software on the computer. The students published these illustrations in a discussion forum entitled "Pictures of Our Tribe" so that they would be able to share them with the other students in the class. Some students chose to work together on this project, and as they posted their work, they were able to write feedback to each other within discussion forum. Katie's illustration is given in Figure 9.

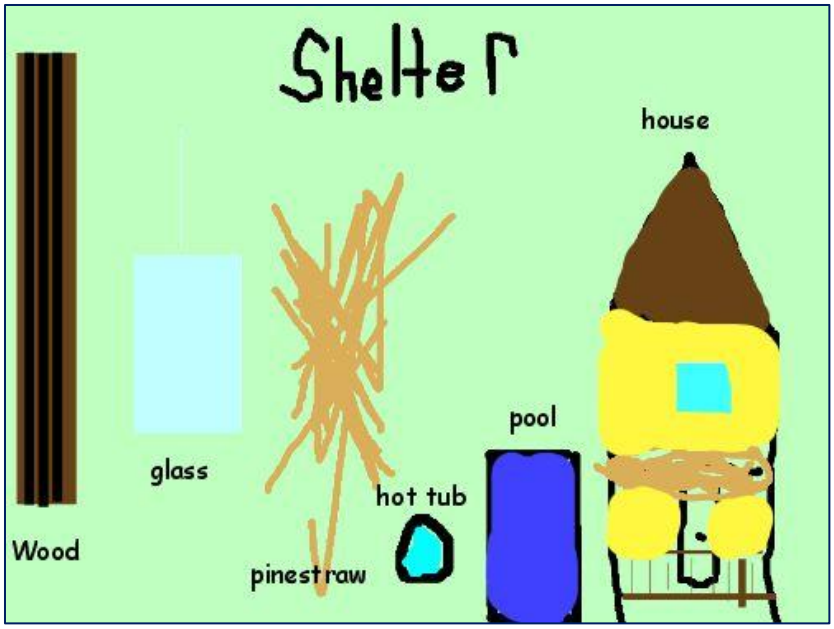

Figure 9. Tribal Shelter

Final Reflection

The synchronous Live Chat was a challenge during this week because so many students are interacting simultaneously, and it was difficult to reach consensus about the design of the tribe. However, it was a dynamic strategy to have all of the students involved in the same activity that really could not be replicated in the face-to-face classroom. Throughout this week, there was a noticeable bond among the students in the classroom, and the students discussed these connections to other members of their learning community.

Rianne explained that there are many ways that they are interacting with each other. "It helps by like working in groups," she said, "and to post and ask questions about what they said. It also helps by sometimes helping each other and them helping you."

Working within the OLC had also impacted face-to-face interaction and communication among the students. According to Alejandro, "It has changed a lot because some people don't

get in trouble as much and are starting to get good grades. We have more time to do our work, but we also do our work faster online."

The students also noted some changes in their classroom since the onset of the study. One change was that students were participating more and sharing the workload better when working in groups. Jackson determined that this change to more active participation was due to the quality of work that they were now completing. "I can see how school has changed for most people," he said. "The projects online have changed them from not wanting to cooperate to wanting to cooperate." Although he felt that there should be additional improvements in this area:

> "Most people have changed and are working together, but if you put one bad worker in a group with two other good workers, then that person isn't going to do as much work. If you put three bad workers together, they are going to realize that they are going to have to do the work because they can't stand back and let someone do it all for them. People have changed because they have finally realized that it is easier now because they have lots of ways to research their topics."

> Kristy described in detail why she thought the class had begun working as a group: "Well, I think that it has brought us all closer together like a tribe," she explained. "At the beginning of the year before we started doing this, we didn't do too many group projects. When we started working together, we started to interact more and finish our work more. A lot of people used to get in trouble before we started this, but now that we've started working online, it has caused us to bond."

The students further described their favorite aspects about working within the OLC, and some of these features are as follows: projects, communication, collaboration, and learning about new topics. The students related factual information that they had learned from the projects about Native American tribes and explorers. In addition, they described their different roles within the OLC and in the face-to-face classroom. Finally, they noted that they had also gained new technical skills since beginning their work within the OLC, but they now wanted even more opportunities for online interaction with each other.

Summary

Through each week of this investigation, the design of the OLC was modified in order to address the needs and interests of the participants within the context of this fourth grade classroom. During the five weeks of this exploratory investigation, various issues, trends, and concerns were revealed that could each prompt further study regarding online learning in the elementary grades. However, there were particular outcomes that were consistent throughout the study. These outcomes were organized around the features of the LMS that encouraged collaboration, how interaction occurred and developed throughout the study, and the benefits of online learning for these participants.

Particular features of the LMS encouraged collaboration among the students, and they were used as purposeful strategies within the design. The organizing structure of the LMS with its system of folders, files, and activities assisted the students as they worked in their collaborative groups. They became more self-directed with the available resources since their assignments and activities were being managed and contained for them. Communication was essential throughout this study to promote collaboration, and the students practiced

asynchronous, synchronous, and social discourse to collaborate with other members of their online community. Throughout these forms of communication, particular trends became evident, and the students responded more frequently to novel topics, to replies to their posts, and to specific questions. The students also were engaged in collaborating with other students in projects and publishing those projects within the LMS. Finally, as the students collaborated with each other in these projects, they made choices and negotiated roles and responsibilities that caused them to assume greater ownership and enhanced engagement in the online learning.

How interaction developed was also of great consequence to this study. The students had to begin learning how to interact within the LMS through specifically designed practice time to assist their future online work. As the students became more accustomed to online interaction, it became necessary for the teacher and me to provide lessons in netiquette to develop a safer and more comfortable online experience. This helped to establish the norms that were essential for learning within an online community of practice. The teacher modeled how to interact within the OLC, and the students themselves were also experts at assisting each other with the technical and academic aspects of online learning. This interaction helped the students to become more self-directed in their learning as well as to provide a sense of community among the participants.

The participants of this study benefitted from this introduction to online learning within their classroom, and they noted an improved classroom climate as a result of their online interaction and collaboration. They developed an increased sense of confidence in their academic and social abilities, and these skills led to positive behavioral changes among the students. Finally, the students were able to help each other learn new information and strategies by combining their knowledge in their online collaboration, and they acquired new skills for learning within an online community of practice.

CHAPTER V

FINDINGS, DISCUSSION, AND RECOMMENDATIONS

The overarching intent of this study was to explore the capability of purposefully designed online learning activities within an LMS to facilitate student interaction and collaboration. As the researcher, I worked with the participants to design the online learning environment, and a strategy for this design was to create an online learning community that continued to evolve throughout each week of the study as it was modified to meet the needs of the participants. In this manner, the teacher and students were also involved throughout the study in the design of the online learning community (OLC) to encourage online interaction and collaboration within an LMS in order to facilitate the development of a community of practice.

However, the data that were collected and analyzed during the iterations of the design often exposed evolving tensions and incongruities. These situations were never completely resolved during this exploratory study; rather, they illuminated possible solutions and additional questions that merit future research. The themes that emerged from the ensuing data were embedded within these apparently conflicting elements and were aligned to the research questions of this investigation. The following original research questions were addressed by this study:

1. What features and characteristics of an online learning community within an LMS encouraged collaboration in a fourth grade classroom?

2. How did interaction among students with each other, their teacher, and the content occur and develop within an online learning community?
3. How did participating in an online learning community enhance learning for the fourth grade students involved in this study?

In the first section of this chapter, I review the broad conflicts that arose during the design of the OLC as they relate to each research question, and I explore the themes that were embedded within those issues. Next, I present some suggestions for future research based on the themes and concepts that emerged. Finally, I enumerate ten recommendations for practitioners for developing online communities of practice for elementary students.

Features and Characteristics that Encouraged Collaboration

The Blending of Online and Face-to-Face Learning Activities

One of the early tensions involved in this study was the role of the LMS within the classroom. Although a majority of their learning activities were contained within the OLC, the students also collaborated with each other on these assignments and projects in the face-to-face classroom. This blending of learning environments resulted in an effective system of organization for facilitating student collaboration throughout the study. Black et al. (2007) explained that in a blended learning environment, students complete some instructional activities online while others were completed in the physical presence of a teacher, and Simonson (2007) noted that an LMS is used to supplement face-to-face instruction in a situation involving blended learning. In Tan & Seah's (2011) study on the use of an online discussion forum to supplement face-to-face instruction, the researchers concluded that the quality of the work that the students

completed online was due to the expectations that the teacher had previously established within the face-to-face classroom.

In the context of the OLC, the instructional design of how folders, activities, and links were arranged in the LMS helped the students work together more effectively in their research and projects. Ms. Johnson and I continually reflected on this design process, and the students commented on how they had easy access to online resources. The ability to house all of this content within one folder in the LMS enabled the students to spend their time collaborating with each other on the projects rather than on assembling materials. It also provided a manageable way for us to track and maintain ongoing documentation of the students' collaborative work so that we could offer additional assistance, as necessary.

At the onset of this study, the students were unfamiliar with the tools that were available in the LMS, and their previous experiences with online learning activities were directed by their teacher with the students working independently to practice and review of academic skills. Although the teacher and students had been using the LMS before the study to review for standardized assessments, they had not used all of its existing tools that could facilitate interaction. Consequently, they needed additional practice with those tools at the beginning of the study. As the students became more skilled with navigating within the LMS, using the available resources for conducting research, communicating about different topics, and developing original projects, more collaboration among the members of the OLC began to occur. They learned how to specify which features they should use to conduct the following specific tasks: (1) selecting links to research sites, (2) communicating via email, (3) participating in discussion forums, (4) reporting information in wikis, and (5) writing stories in blogs. With practice, those tasks occurred more quickly and required less direct instruction and guidance.

Throughout the study, the students requested to have more collaborative projects included within the OLC. All of the following activities were involved in these group projects: (1) collaboratively researching a topic; (2) developing a product to illustrate what they had learned; and (3) presenting these products to the other students in the class. Papert (1993) explained that these types of technology-oriented tasks help students to organize their thinking and develop new understandings about the way things work. The teacher provided her students with different types of projects and having them participate in those activities helped them to learn how to strategically approach new problems and assignments. Hakkarainen (2009) also noted that learning by solving problems assists students in making meaningful connections to instruction.

Individual Responsibility and Collaborative Work

As noted above, the students requested opportunities to work together collaboratively; expressed a preference for working with each other; and explained that this collaboration helped them to learn about new things. According to the students, when they collaborated with peers on an activity, they were not expected to be the expert on everything; rather, they were expected to bring what they knew about the information or to use the skills they already possessed and then build upon their understandings with the additional knowledge of others.

Therefore, while working collaboratively with their peers, the students knew that they would not have to shoulder the entire responsibility for the success of the assignment. This understanding helped to encourage collaboration as the students determined their different skills and abilities while working together. They viewed themselves as a team as they set goals and divided up the workload, and these strategies helped them to develop group interdependence.

They were able to learn together as they shared their information and recognized their strengths and weaknesses as they assumed different roles to complete the online activities.

After the students collaborated online and conducted research related to the learning standards, they began to suggest sites and activities for the other students in the class. This occurred as they began to interact and participate more in the OLC. Wenger (1996) iterated the importance of social participation in the process of learning, as members of a community set goals and plan strategies for accomplishing their work. Vygotsky (1978) noted that this practice involves the scaffolding of new concepts as students are gradually influenced by the expertise of more experienced members of the learning community.

Most of the students were able to negotiate roles and responsibilities when working with their peers, and only a few students complained that they thought they had to do more work on their projects than the other members of their groups. One student who had difficulty working with others was Mallory. Early in the study, she experienced conflict with Jason when conducting research about life in the arctic, and later in the study, she was unable to share responsibilities for completing her research assignments and projects with Luis in their study of the Pawnee Native American tribe. In both of these situations, Ms. Johnson had to intervene. She assigned responsibilities to Jason and Mallory in the first scenario to help them to resolve their conflict, and in the second situation, she allowed Luis to work with another group of students while Mallory learned about the Pawnee and completed her projects independently.

Lin et al. (2008) determined that success within an online learning community is related to one's social ability, and Mallory was unable to fully participate in every activity because of her difficulties with other students. However, Lave & Wenger (1991) explained that through

legitimate peripheral participation, individuals can acquire the skills for working within a community of practice by observing the norms and practices of other members of the community from the periphery of the group. Whether or not Mallory would have been able to eventually develop those skills was not determined during this five-week study; however, individually, she was able to create a story blog and a digital story that showed she was making personal connections to the academic content.

Nadia, on the other hand, was a student who was able to move from the periphery of the group and, according to her peers, developed into a desirable group member. She was a student in ESOL who often had difficulty explaining herself verbally due to her limited proficiency in English. She explained that she was a hard worker and could be both a leader and a follower; although she preferred to follow when she was working within a group. Nadia also said that working within the OLC changed her by giving her the time she needed to understand so that she could complete her assignments and communicate more effectively.

Asynchronous and Synchronous Participation

One of Ms. Johnson's concerns when planning the study was that in previous instructional units, she felt as if she did not have enough time to delve into content in-depth. However, because of the needs of her students, she felt that she had to spend more time on particular concepts so that they could fully understand the learning standards. Working within the OLC, provided additional flexibility in time for the students as they were able to work more independently on the concepts that they already understood and use their time to collaborate effectively with their partners and group members to create original products. Students who often had difficulty with following the same pace as their peers in the face-to-face classroom

because of language differences also noted that they had more time to understand and reflect on new information online, and they also had the time to write more detailed responses due to the asynchronous nature of the assignments. This enabled them to have a more collaborative role with the other members of the class than they usually experienced in the face-to-face classroom.

Different forms of online communication were used throughout this investigation, and this communication within the OLC had a crucial impact on encouraging collaboration. As the students posted their ideas about what they were learning within the discussion forums in the OLC, they were able to collaborate beyond the normal limitations of time and space. Asynchronous discussion had several benefits that encouraged collaboration. First, the students were able to take time to compose their thoughts into coherent messages. They could check for errors in their writing and correct those mistakes before submitting their content. This provided the students with more confidence about sharing what they had learned and expressing new information. Asynchronous discussion also allowed collaboration to take place over a period of several weeks as students continued to use particular discussion forums throughout the study. This feature was beneficial as the students developed skills or interests later in the study and were able to post to those original forums.

Synchronous communication via the Live Chat feature of the LMS was also an effective way of enhancing collaboration by facilitating the sharing of ideas and information in a way that could not be replicated in a face-to-face environment. The students were able to have a discussion about how to design their community tribe with everyone sharing their ideas simultaneously, so as the students contributed their suggestions, everyone could review them and respond to them immediately. In this way, several threads of a discussion also occurred at once.

Then, everyone was expected to be a collaborative member of the activity and participate in the discussion instead of solely the first student to answer the teacher's questions.

How Interaction Occurred and Developed

Teacher-Directed Activities and Student Choices

One of the greatest areas of conflict that emerged in the design of the OLC was whether or not to require student participation on assignments in order for them to complete and attempt those activities. Many of the students requested certain types of activities that they thought would be engaging, but when those activities (discussion forums about personal interests and interactive websites) were first incorporated into the design of the OLC, the students did not complete them without being required. Yet, they completed the teacher's assignment to practice for their upcoming standardized tests. The students waited for the teacher to decide all of the topics they should study and discuss, but in this design, they were encouraged to become engaged in determining the direction of the learning community. Papert (1993) posited that the process of learning becomes more self-directed as children work with computers; likewise, Lee (2005) observed that students working with an LMS became more motivated and self-directed learners.

In their initial online work, the students were not used to making choices about what types of activities they should complete and had to have their work specifically assigned to them. We then attempted to scaffold their choices to achieve more online interaction. Since it was difficult to design just one activity that was able to motivate every student, we focused instead on designing several different types of strategies and discussions and encouraged the students to choose how they wanted to participate. With continued experiences with a variety of activities,

both the teacher and the students learned to provide recommendations for new projects to others. The students were also able to utilize their newly developed abilities for designing original presentations.

Using multiple strategies for presenting online content also created opportunities for interaction. The students read online text, watched videos, participated in online games, and collaborated in activities with their peers. Chang et al. (2011) found that when a variety of learning strategies are used to present instruction that students develop greater satisfaction, degree of participation, achievement, and learning performance. The students consistently requested additional activities and sites for their learning, and I observed that the students were more engaged in the OLC as they interacted with various forms of online content. Bernard et al. (2009) explained that using multimedia and multiple modes of presenting information, helps students develop an understanding of complex concepts.

Because of the variety of teacher-directed and student-selected activities within the OLC, the students were able to use many different modalities to show what they had learned. They utilized communication tools, participated in wikis and blogs, researched on the Internet, and developed multimedia projects. They also had opportunities to work individually and collaboratively. When the students requested more projects, they were motivated to work on those projects for a variety of reasons. First, they were assuming that they would be working with a partner or a team to present information that they would be learning collaboratively. Second, some type of visual imagery or picture was associated with that presentation. Finally, the project usually involved a presentation to the rest of the class, either by being uploaded to the OLC or presented face-to-face. In this way, the project was published and an audience received the information that was presented. Knowing that their work would be published and reviewed

by everyone caused the students to collaborate with each other to produce quality work. This differentiation of activities provided the students with various situations so they were more likely to experience success within the learning environment.

Academic Standards and Personal Interests

As the students became more self-directed within the OLC, another issue emerged; they were empowered with choosing the types of content that they wanted to explore online, yet the teacher had specific academic content that she wanted to teach during this unit. When the students worked on their assignments within the OLC, they were able to choose many aspects of ways they learned the content, and their choices encouraged additional interaction. The students often selected topics they found interesting and as they worked on those topics, they collaborated with other motivated students who also shared those interests. At other times, they were able to choose which students they would collaborate with on their projects, and while they were working, they could choose how they would research content and the order they would follow to complete their assignments. These choices initiated collaboration among the students as they negotiated how they should proceed in their work.

However, we had to determine how to integrate personal interests into the academic content, as necessary, in order to continue developing a greater sense of community. One of the most effective ways of motivating and empowering the students in this study was to encourage them to personalize the learning experience as they explored topics of interest and used their personal technology devices to facilitate their learning activities. Bernard et al. (2009) explained that this motivation can occur through student interaction with the teacher. Furthermore, he said

that as students interact with content, they construct meaning by relating the information to personal knowledge and applying it to projects.

As the students continued developing new skills for learning within the OLC, they began making choices about how they wanted to explore new concepts and discuss topics of their personal interests. I originally anticipated that this would be a focus of the investigation, and provided a discussion forum to facilitate personalized learning in the initial design, but it did not become fully developed until the fourth week of the implementation of the OLC. At that point in the study, even the teacher began collaborating with the students on a topic that she found interesting. As other students observed their peers, as well as their teacher, interacting with personal areas of interest, they too began suggesting new topics for additional study.

In this exploratory study, the question of how to balance academic content and personal interests was never completely answered. Opportunities for both of these forms of content were designed and encouraged, and both helped interaction to occur and develop. Furthermore, the students only began pursuing their personal interests as they became a more collaborative community, and this had to be facilitated by the teacher. Dubé et al. (2006) explained that developing an online community of practice involves gathering members, identifying common interests, choosing technology, and developing norms and processes. The students' pursuit of their interests likely grew out of their interaction with each other, their teacher, and the content in this study. As Abrami et al. (2011) noted, the process of learning is sustained as the students become more self-directed and motivated to interact with each other.

Teacher Knowledge and Student Expertise

Another issue that encouraged interaction involved the shifting roles of the teacher and the students through their participation in the OLC. Blomeyer (2002) iterated that the teacher has to become more facilitative and less directive within an ideal online environment and to provide more constructivist learning experiences that emphasize authentic tasks and project-based work. Abrami et al. (2011) explained that when students interact online, they can improve in self-regulation, which in turn may lead to setting goals; demonstrating personal interests, focusing attention, and achieving more self-control. Throughout the investigation, the teacher had to model effective interaction for the students. This interaction involved posting leading questions and responses within discussion forums. Highlighting the work of particular students also caused the students to attempt to replicate that kind of work. As the teacher interacted with the students in the OLC, they often responded to her and each other. Finally, when the teacher began exploring her own interests and interacting with content online, the students also followed her example. In this way, the teacher was critical to developing the interaction that occurred within the online environment. Through her interaction in the OLC, Ms. Johnson became a participant, mentor, and organizer; accordingly, these roles are described in more detail in the following sections:

1. **Participant.** When Ms. Johnson participated with the students in the OLC, she modeled the types of social and learning behaviors that were essential for effective members of a virtual community of practice. We observed that the students responded to their teacher's interests in particular posts and topics, and when we wanted the students to participate more in online discussion, Ms. Johnson asked probing questions about their topics. Bernard et al. (2009) noted that this type of

online student interaction with a teacher can stimulate interest and motivation. Consequently, when she interacted with the students by commenting on their posts within discussion forums or by asking questions, other students in the classroom would try to achieve that same type of attention from the teacher. Online communication with a teacher, as noted by Drexler et al. (2007), not only increases the motivation of students to write, but it also improves the quality of their writing. Likewise, when the teacher shared her personal interests with the students, they were eager to share in her interests and interacted with more enthusiasm.

2. **Mentor.** As the community continued to develop, the students began assuming more ownership over the types of activities that they completed within the OLC; however, Ms. Johnson still had to facilitate this process. I was concerned that if every assignment was teacher-directed then the students would not operate fully as self-directed participants within the learning community but would wait to follow her lead on every assignment. Tan & Seah (2011) observed that encouraging desired student behaviors in an online environment requires intentional and continual support from the classroom teacher, and the teacher's online presence has an impact on the students' learning behaviors. While students were working collaboratively, Ms. Johnson helped them by thinking of possible alternatives and offering suggestions. Drexler et al. (2007) found that feedback from a teacher was encouraging to students in online discussion. The guidance she provided for them helped to set the tone for their online interaction.
3. **Organizer.** According to Bernard et al. (2009), online learning environments do not necessarily develop into communities of practice by themselves. By planning and

> organizing activities within the OLC, the teacher and I influenced the types of procedures that the students developed to complete the work of their online community. Cavanaugh et al. (2004) explained that the teacher plays a crucial role in the successful development in the online learning environment, and Drexler et al. (2004) noted that when teachers organize online activities, students are excited to learn more about those topics. Not only do the students find this content engaging, but it is organized by the teacher specifically for the students. In this study, we had to facilitate the development of community of practice by planning activities, exploring topics, remaining involved, and guiding choices while simultaneously providing a receptive environment for the students to generate their own ideas and procedures. Furthermore, we had to provide the time and expectations necessary for the students to adequately reflect on their learning and share that learning with others. This online collaboration had to be purposefully designed by the teacher and me because it did not occur automatically for everyone within the OLC. We had to structure activities that encouraged collaboration through the tools available within the OLC in order to develop a sense of community within that online environment.

Through their interaction, the students were also beginning to rely on each other for support rather than on their teacher. When the students had developed specific skills and strategies either academically or technically, they were able to work with each other to solve problems. The students usually helped each other in this online environment rather than turning to their teacher for assistance. The students knew who the experts were in the classroom when they needed help, and this enabled everyone to accomplish their assignments more quickly than having to rely continually on the teacher. In addition to solving their own technical issues, the

students also became more comfortable at learning from each other by coaching each other in academic skills. As Katie explained, "You get to use computers and learn new ways to work things out online. I also like that your friend might be able to help you fix a problem. It also increases our learning by not only learning about our project but learning computer skills too."

The students noted how their online interaction was helping them develop dynamic networks that facilitated their learning. For example, they knew who to ask for technical help or who to ask for help with specific academic areas. They began communicating with each other for different purposes and realized how to interact with each other to solve problems and create projects. When I first started working with them, there appeared to be definite groups of students, and they mainly communicated with the friends they already had prior to the onset of the study. There were students with specific behavior and learning issues that seemed to divide the class into specific groups. There were definite differences between the ESOL students, EIP students, and students with behavior problems. At the beginning of the research, it was apparent that some of these students had withdrawn from the practices of learning within the class as they stood back and allowed the other students to lead and answer questions. Throughout the study, there were more children interacting together in changing groups based on different purposes, and this continued to be more evident during each week of the design.

Informal Communication and Formal Discussion

Consistent communication in the OLC led to additional student interaction in both the face-to-face and online learning environments and occurred both within and beyond school. The students utilized the communication tools of the LMS for social reasons as well as for learning activities, and understanding interaction through both informal and formal discussion

within the OLC developed into another issue during this study. Originally, I began the investigation by planning opportunities for the students to discuss what they wanted to learn more about in the OLC as a way to develop interaction. There were few responses to that discussion forum, and those responses did not provide an impetus for the other students to reply to them.

The students finally began communicating more intensively when I provided situations for them to share their Spring Break experiences with the rest of the class. Although this communication was predominately social, it had an impact on the culture within the online learning environment as the students to begin interacting with each other and the teacher. The students also noted that these online social conversations helped to encourage collaboration by developing a sense of community. They were interested in learning more about each other and responding to each other, and as they developed more of an understanding of each other through informal communication, they became more willing to collaborate with each other on additional projects and activities within the OLC.

I also observed that as the students collaborated in online discussion, they posted more responses to particular entries in discussion forums. The students commented that those posts discussed interesting topics or shared novel concepts that the students did not know that much about. As the students noticed that these topics encouraged more discussion, they began attempting to write about new and original topics and included more specific details in their posts. In addition, they began asking more questions of each other online, and when students posed questions to their peers, they were likely to receive more replies to answer those questions. Furthermore, the students mentioned that they were particularly motivated to go online and read replies to their own posts because if someone was talking about a topic or a thread of discussion

that they originated, then they were especially curious about the conversation that they had started.

Establishing some guidelines for appropriate netiquette helped to develop more interaction in this investigation as the students felt more comfortable communicating with their peers and teacher. The faculty members at the school had some anxiety about the content of messages and posts that the students would communicate to each other online. Furthermore, because of the growing concerns of the students at one point in the study, the teacher had to teach a lesson in the use of appropriate online communication, and the students watched a student-generated video on the importance of netiquette within the OLC. As the students began practicing netiquette in their online work, they were able to post their ideas and questions without the fear of being ridiculed for their mistakes in spelling and grammar or for the content of their messages. Therefore, students were encouraged to take more risks to expose their academic weaknesses within the OLC, and this risk-taking revealed opportunities from them to learn from their peers in a more collaborative environment.

Findings from this study indicated that communication played a critical role in the design of an online community of practice as the students learned more about each other. The students had to be provided with opportunities for informal discussion to develop interpersonal understandings that led to greater learning opportunities by creating relationships that prepared them for the interaction that was necessary for collaborative learning activities. This necessity of social discourse within an online learning environment was supported by the research of Maher (2009), and he noted that it helps to create further student participation in collaborative projects and future communication.

I designed opportunities so that students could share informal experiences, and this casual interaction rapidly initiated other types of discussion within the OLC. By scaffolding discussions within the design of the OLC, we were able to move from the social discourse about Spring Break to the more formal discussion of current events. It was difficult for the students to participate in formal discussions about academic concepts when they had little background knowledge of that content. Through their participation in collaborative activities about Native American tribes and explorers, they were able to develop enough of an understanding of those topics in order to effectively participate in an online synchronous discussion in the final week of the study. This finding was also noted by Drexler et al. (2004) who explained that as students interact with links and online activities, they learn more about the content and begin to draw conclusions, transfer knowledge, and make comparisons and contrasts.

Wenger et al. (2002) explained that as individuals interact in a community of practice, they begin to develop new tools, procedures, and structures that help them to work together as a group. Online communication was essential to the development of the OLC in this study, and as the students communicated with their peers, their teacher, and me, the culture of the learning environment began to be established. This culture included the norms for conversing in the OLC and the expectations for student work and behavior. When students participated in discussion within the OLC, they began to exhibit more effective interaction both in the online environment and in the face-to-face classroom.

The Benefits of Online Learning for the Participants

Interpersonal and Intrapersonal Changes

As the students began participating in more collaborative online work, the qualities of the face-to-face learning environment also began to transform. Some of this change was due to the types of group projects that the students were completing in this environment. In this context, the students were encouraged to interact in order to share ideas and information with each other. They were actively engaged in their small group activities instead of receiving whole-group instruction and were making choices independently and collectively about the ways that they would pursue and present information. The students were usually not sitting in the same type of seating arrangement, and they were using different types of technology hardware and software. An active classroom where everyone, including the teacher, was engaged in learning had begun to develop.

Through participation in the OLC, many students achieved a sense of success in their learning experiences. For some of these students, this led to more confidence in their academic and social abilities within the online learning environment. This produced a shift in how students viewed themselves as members of their learning community. They became more central to the activities of the group as well as becoming desired team members and work partners. In this manner, they also illustrated the concept of legitimate peripheral participation (Lave & Wenger, 1991). They remained at the periphery of the OLC, observing the discussions and practices of the other members of the community, and when they felt confident in her own abilities and had the responsibility to complete an essential process, they moved into a more prominent position within the community and were seen as leaders.

Lee (2001) documented that the use of a web-based learning environment helps to provide a sense of community in which students are able to learn collaboratively. In this study, Ms. Johnson made the observation was that her students were talking more as they were developing stronger social connections through their online collaboration. Because the class was interacting so extensively online, they were developing more friendships in the face-to-face classroom. According to Ms. Johnson, they even disturbed other teachers because they had become more talkative as they walked throughout the school while transitioning to lunch and other classes. They also began to interact more with me, and in this way, I felt that I was also being drawn into the community of practice, even though I was the researcher involved in the design of the OLC.

The enthusiasm for working with their peers became more evident in the classroom as the students eagerly shared ideas and experiences with each other. In addition, the students reported that they were playing with each other more on the playground because of their interaction with each other within the online learning environment. Before their work in the OLC, they judged each other based on their previous observations and expectations, but when they read the posts of the other students and collaborated with each other on projects, they began to see them in new ways. As they interacted online through discussions about personal experiences, they began to feel a stronger sense of commonality and community. The asynchronous discussions about a variety of issues and working together toward common goals formed an interdependence that had not existed in the face-to-face classroom. After participation in the online learning environment, they were more willing to listen to each other in face-to-face conversations, and they were more accepting of working and playing with each other in new situations.

As students began collaborating more with each other on their projects and assignments in the OLC, their interaction also had an impact on their individual learning. Simone explained, "I like working together with other people because you can combine their knowledge to learn things you didn't know with things you did know. So you can learn some things you didn't know so you can make it stick in your mind." While planning and working on their online group projects, they had to decide how they would share responsibilities for completing the group work. The students were also collaborating effectively on their assignments, and this collaboration was helping them learn new concepts related to the academic standards. Finally, they were practicing new strategies for solving problems and negotiating meanings within interdependent groups.

Future Research

This design-based research experiment enabled me to explore the context of the learning environment on a level that could not have been achieved with other research methodologies. However, another source of tension existed in the methodology of the research. Introducing a purposefully designed innovation within a community to see how the participants interacted with it and each other while simultaneously relating their personal experiences in their voices through the traditions of qualitative research was challenging. The advent of online learning in the elementary grades is such a relatively new phenomenon, that I needed to observe what would happen as the OLC was continually refined and implemented within this natural setting.

As the participants interacted and collaborated within the LMS, the conflicts that were illuminated in the design of the OLC, lent themselves to further research in the development and implementation of online communities of practice for elementary students and teachers.

Although I observed remarkable growth in the online community of practice within this elementary classroom, I have realized the following opportunities for further research:

- In this study, the students used their personal technology devices to access the OLC, to communicate with their peers, to research new information, and to develop original products. Therefore, the use of their devices increased opportunities for interaction within the community. Using their own devices also enabled the students to continue learning online even when they were in their homes as they accessed their learning community to persist in collaborating with their peers. More research is needed, however, on the use of personal technology devices to facilitate online learning in the elementary grades.
- As the students began to utilize the LMS, their online activities and learning blended into their face-to-face collaborative experiences. More comparative research should be conducted on the extent of blended instruction in the elementary grades. Cavanaugh et al. (2004) iterated that online learning has become so pervasive that it should no longer be solely compared to face-to-face instruction; however, the qualities of effective blended learning experiences need to be explored in more depth. This future study may also illuminate how blended learning could extend instruction beyond the school day.
- Although this study focused more on the development of the overall community of learners, some students' particular stories began to emerge and their individual roles within the group began to shift. A research study that focused on individual students and their personal experiences within an online learning community may be beneficial to practitioners as they assist students in online learning.

- Students in the ESOL program explained that they were able to learn more effectively online because they had more time to communicate with others. This also led to a change in how other students perceived them while working collaboratively. Therefore, the particular effects of online learning experiences on students with limited English proficiency could be a valuable future study.
- Asynchronous learning experiences were utilized throughout this investigation, but the students were not ready for synchronous online activities until late in the study. More research could be conducted in the use of synchronous online learning strategies (such as web conferencing) to understand their role in online learning for elementary students. This knowledge could help teachers design more effective online activities for students in other settings.
- In this study, the exploration of personal interests and social discussions led to more interaction and collaboration within the OLC; however, these activities were often outside of the scope of the academic standards for fourth grade. A study that specifically investigated the possible effects of learning experiences that diverted away from prescribed academic content would be beneficial; especially since the work of Wenger et al. (2009) suggests that these types of activities arise naturally out of interaction within an online community of practice.

Implications for Practice

The analysis of the data collected in this investigation led to some implications for practice and suggestions for future research. The 2010 National Educational Technology Plan presented five goals with recommendations for stakeholders to improve educational

opportunities with the assistance of technology (National Educational Technology Plan, 2010). The following goal for learning was included in the plan:

> All learners will have engaging and empowering learning experiences both in and out of school that prepare them to be active, creative, knowledgeable, and ethical participants in our globally networked society. (National Educational Technology Plan, 2010, p. 23)

This design-based research investigation explored collaboration within an online learning environment and examined how the interaction of students with each other, their teacher, and content developed as an online community of practice. Although the findings of this study were specific to the particular context and the experiences of these participants, practitioners may find value in some of the implications of this research. In the following section, I have summarized some of these implications in the form of recommendations.

Recommendations

According to the main objective of design-based research, findings from a study should inform further considerations of a learning theory (Barab & Squire, 2004) - in this situation, of online learning communities of practice. Therefore, in this section, I provide recommendations for practitioners desiring to develop online communities of practice for elementary students. These recommendations are based on the conclusions derived from the design of the innovation and the experiences of the participants within the context of this study. Furthermore, some of the procedures incorporated within the methodology of this study may also provide guidance for other design-based research experiments.

1. **Teach Netiquette at the Onset of the Implementation.** Teachers and students working collaboratively within a learning management system have to negotiate and establish the

rules of communication and etiquette that determine how a learning community will function. Lin et al. (2008) noted that as learners become more comfortable interacting and communicating online, the more likely they are to form a class community. A community of practice entails more than just communicating with friends for pleasure; the commitment to the topic of shared interest is what creates the bond within the group (Wenger et al., 2002). By teaching appropriate netiquette at the beginning of the school year or when initiating an online learning experience, a teacher could help facilitate the norms of group interaction that can assist the students in feeling a sense of safety and community. These feelings may lead to increased self-confidence and enhance motivation (Abrami et al., 2011).

2. **Incorporate Time for Social Discourse and Conversation.** When students described their Spring Break activities within the online discussion forum, they were able to relate and connect to each other's posts in the discussion. This online dialogue helped to give them a new appreciation of each other. Maher (2009) also drew this conclusion in his research on the community-building function of social chat within an online learning environment. In this study, as the students engaged each other in social discourse in the OLC, they were more motivated to interact online with each other in collaborative projects and future communication. According to Bernard et al. (2009), student to student interaction is essential for learning and support, and the sharing of common interests is necessary for operating within a community of practice, explained Wenger et al. (2002), as it can lead to collaborative problem-solving and the development of shared understandings. In educational settings, students and teachers need to provide time to establish and nurture communication in order to create a sense of community that is

conducive for collaborative learning experiences. This communication should not only be content-oriented, but it should include social discussions that lead to greater personal understanding, acceptance, and tolerance.

3. **Encourage Opportunities for Student Collaboration.** In the OLC, the way projects were facilitated was not by having the students involved mainly in solitary efforts, but rather, through group activities. In this manner, the students could work with other members of their community in order to put into practice the social construction of knowledge. Then they could build upon what they knew with each other in conjunction to acquiring new information from external sources. Abrami et al. (2011) explained that as students collaborate with each other, they can demonstrate higher levels of achievement. Social participation is crucial to learning processes (Wenger, 1996), and from the onset of this study, the students requested opportunities to interact with their peers in collaborative work. This entailed less risk because they were able to help each other while collectively developing an understanding about a topic. The students were able to learn from each other as share the responsibilities for their projects. Vygotsky (1978) explained that children bring their own understandings to the learning environment, and as they interact with their peers they integrate these understandings with new experience to construct new meanings.
4. **Provide the Students with Choices.** Throughout the design of the OLC, the students expressed that they wanted to make choices about the types of activities that they had to complete. They also wanted to decide how they should organize their collaborative work on their projects. Drexler et al. (2004) documented that as teachers provided students with links and activities to additional websites for research, students were engaged in the

learning process, and began to choose their own time during recess to work on these learning activities. Abrami et al. (2011) noted that well-designed interaction includes opportunities for students to make choices and could lead to higher levels of interest in learning and increased motivation. When we developed activities for the students to complete within the OLC, we had to consider that new projects had to be explored, choices had to be incorporated into the design, and the students had to have opportunities for collaboration.

5. **Encourage Asynchronous Participation.** Another characteristic of the participants' practices within the OLC that encouraged collaboration was the asynchronous nature of their online work. Tan & Seah (2011) observed that the asynchronous discussion forum helped to enhance inquiry among fourth grade students. In this particular context, students communicated with each other, worked together on projects, or used links to locate information or complete activities; furthermore, they were usually involved in different pursuits within the online learning environment. They collaborated online at different times and about various topics; likewise, they were involved in different aspects of their projects throughout each day. The asynchronous work had an influence on work within the face-to-face classroom in that the students had large portions of time dedicated to online endeavors and collaboration. Whole group lessons became shorter and were usually reserved for providing directions or sharing strategies. Bernard et al. (2009) explained that asynchronous interaction is essential for learning and support, and through this interaction, students could develop more skills in self-directed learning and self-motivation.

6. **Have Teachers Model the Learning.** Many great teachers have an innate understanding about how to develop a community within their classrooms. Their interactions with their students, their high expectations for every student, and their enthusiasm for learning can motivate even reluctant learners. Tan & Seah (2011) concluded that the types of activities that are able to be conducted by students in an online environment are linked to the learning culture that the classroom teacher has helped to establish. Knowing how to establish this type of environment in both the face-to-face classroom as well as in the online classroom is an essential skill for creating an effective learning community. Vygotsky (1978) proposed that as teachers collaborate with their students, they can facilitate meaning construction. The teacher also needs to learn strategies for designing an online learning community that supports the interactions that occur in the face-to-face classroom. They have to understand that everyone, at some point, is a newcomer at the periphery of the learning community (Lave & Wenger, 1991), but through interactions in the community, everyone has an opportunity to contribute to the core practices of learning.
7. **Practice the Technical Skills.** It was more complicated for the students to complete a new project or product when they had no previous experiences with the skills needed to complete that project. When they had the opportunity to make choices about the types of projects they would like to create, they chose to do the types of activities with which they were already familiar and understood how to complete. Papert (1993) acknowledged that students are able to construct new understandings as they work with computers to discover new capabilities. Wenger et al. (2009) noted that as students have additional experiences with online tools then they become more effective members of their

community. Bernard et al. (2009) recommended that the tools within an LMS need to be utilized with elementary students in order to determine how they can increase interaction. As the OLC was continually modified and we introduced new opportunities for collaboration, we had to provide practice time for the students so they could utilize the new technology tools effectively.

8. **Utilize Student Experts.** Learning within the OLC included some new challenges for the teacher and the students as the focus of instruction began to become more student-centered (Blomeyer, 2002). The participants were learning technical skills related to learning online that involved using new tools including features of the LMS as well as personal technology devices. They were also having to practice new strategies for collaboration and becoming more self-directed. In order to facilitate this paradigm shift within the classroom, teachers could utilize the strengths of students and their willingness to help each other as they learned how to work together. This sharing of expertise helps to shape the online community of practice (Wenger et al, 2009), and as the members support each other, they develop new social bonds to assist in further collaboration.
9. **Develop Understanding through Discussion Forums.** An important feature of the OLC that encouraged collaboration and interaction was the purposeful use of discussion. As the students participated in discussion forums, they were motivated by sharing personal experiences and learned new information and ideas with the rest of their community; this finding was also noted in Maher's (2009) research on the online social interactions of elementary students. Sometimes, the students would relate basic information such as facts, and these posts received few responses from the other participants. What generated interest in a particular topic was often an idea or concept

that was atypical, but one that the students could understand. For example, one student discussed eating chicken hearts with passion fruit sauce. The students had previously constructed some possible understandings of this concept because of their past experiences with chicken being processed into various shapes, but the novelty of the student actually eating hearts was interesting enough to fascinate them about that topic. Through online discussion, the students were exposed to events that they wanted to know more about and, consequently, participated more enthusiastically in those discussions. As the students interacted and communicated with each other online, they were able to develop new understandings from these social practices.

10. **Explore Personal Interests.** As I continued to work with the participants in this context to design the OLC and encourage different opportunities for interaction, the teacher and students began exploring and sharing their personal interests. Abrami et al. (2011) related this phenomenon to an improvement in self-regulation. It also helped to build the community, as students made meaning from their personal experiences and shared them with others (Wenger et al., 2009). In addition, although I never intended for the use of personal technology devices to become a focus within this investigation, it quickly became relevant as the students were enthusiastic about bringing their personal technology tools to school to facilitate their own styles of learning. The use of their devices was a way to help students achieve more access to the OLC so that the students would be able to participate in those online activities. However, they were so knowledgeable about their devices and so willing to share this understanding with others that this small initiative caused the interaction and collaboration among the participants in this community of practice to develop rapidly. Many of these students became experts at

their own devices and approached their online activity and learning in a manner that was unique due to their capabilities with their devices.

Reflections

As I look back on the opportunity to learn through this dissertation experience with the participants in this study, I am astounded by the determination of teachers and students to develop effective learning communities in spite of all of the obstacles that they face each day. Advances in technology continue to create learning opportunities, and this investigation afforded the participants and me with the prospect of exploring new innovations in instructional technology. I firmly believe in empowering teachers and students with novel approaches and strategies for improving teaching and learning. Many of these approaches today involve the use of new technologies to develop original solutions to problems.

The strength of this study lay in its methodology of design-based research to explore the learning environment within its unique context. The qualitative data that I collected during the study enabled me to tell the stories of the participants as they grew as individuals yet continued to interact collaboratively to develop their online learning community into their tribe. This challenge of maintaining one's individuality while effectively working as a member of a group is a reality of life and making that connection is a key ingredient of lifelong learning (Thomas & Brown, 2011). Collaborating and interacting within a community facilitate support for learning, yet these practices enable people to feel satisfaction as they explore their personal passions and interests.

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APPENDIX A

QUESTIONS FOR ONLINE OPEN-ENDED STUDENT SURVEYS

These questions will be posted within a survey of the online course. There are many purposes for these questions. First, answering the questions may assist the students in becoming more adept at using the learning management system. Also, the questions may cause the students to start thinking about a virtual community of practice, and, finally, the responses to the questions will be used to identify topics or themes where the students may need additional support or modifications to the learning module.

Preliminary Open-Ended Survey Questions

- What types of activities can students do online to learn more about a topic?
- How can students work together online?
- What does it mean to be part of a group when working together?
- Explain whether you consider yourself to be more of a leader, a follower, or both when you work with a group.
- How can your teacher help you when you are working online?

Week 1 Open-Ended Survey Questions

- How do you feel about working with other students in your class?
- Besides your teacher making you work in Angel, what other things would make you WANT to work in Angel?
- How do you learn from working with other students?
- What do you think about communicating with others in Angel?
- How could your discussions in Angel be made even better?

Week 2 Open-Ended Survey Questions

- How is your online learning community changing over the last few weeks?
- What other things should still be included inside this learning community?
- What is the most interesting discussion post you read from a student in your class? Explain what made it interesting.
- What has been the most difficult part about learning online?
- What has been the best part about learning online?

Week 3 Open-Ended Survey Questions

- What is your favorite part about working in the online learning community?
- What do you think about the changes in the online learning community?
- How does the use of clipart or photos affect your work or interest in the online learning community?
- How do you predict that your group project will turn out?
- How do you think your individual work compares to your group work in the online learning community?

Week 4 Open-Ended Survey Questions

- What did you learn about working with a group or in the online community from you project?
- What has been your biggest contribution (or what you did to help out) to the online learning community?
- How would you change the online learning community to make it better for you?
- What is your favorite part of the online learning community? Why?

- How has the online learning community changed you as a learner?

Week 5 Open-Ended Survey Questions

- How does your online learning community help you connect to the other students in your class?
- How has your online work changed your face-to-face discussions in class?
- What things have you learned about using technology to show what you know?
- How have you developed networks for learning together online?
- How has working online changed your ideas about how you learn?

APPENDIX B

SAMPLE QUESTIONS FOR FOCUS GROUP INTERVIEWS

Each week during the study, four students participated in a focus group interview about their activity, perceptions, and suggestions for the Online Learning Community module. I began each interview with a general statement and an overall question about their online work, and as the students responded, I followed up their responses with additional questions. Their participation was essential to the modifications that we made to the OLC, and I have included some of the questions that I asked during these weekly interviews in the following list:

Week 1

- We're participating in a study together. I'm learning about how kids work together, mainly online, but sometimes face-to-face, in a fourth grade classroom. I had you all complete the online interview.
- What did you think about that process?
- How do you think it's working out?
- What do you think about learning so far this school year up until before we started this study? What do you think about how your class works together?
- Is there any way that you could see that learning online could use some of those things that you like about learning?

Week 2

- We're going to have a conversation about what you do online. I'm going to ask you some questions, but everyone does not have to answer every question. You can also ask your own questions.
- So how do you think it's working so far, doing so much work in the online learning community in Angel?
- Since I've started working with you, you began BYOT, and the reason you use BYOT is so that you have more access to get online. What's changed in the way your class is doing things online?
- We've talked about reading online. Is there anything else besides the teacher putting sites or links or reading materials, is there another way. Is there anything else that could be added to this Angel course to make it better for you to learn?

Week 3

- I'm asking you these questions to learn more about how kids learn together online.
- So you've been doing a lot of online learning so far, and what do you think about it?
- So there are some tools that can help you when you are writing online. What about the communication that you've been doing online in the online group?
- Do you feel like you're able to talk more online or share more ideas online than you do when you are face to face?
- So do you wish that all of schooling was online, or do you like it all face to face, or do you like the mixture of both?

Week 4

- We are going to talk about learning online and the work you've been doing in your classroom.
- What do you think about the online learning that you've been doing in your class?
- Do you like finding the information yourself that way by going online or do you prefer the other way?
- How do you feel that the work you've been doing over the last five or six weeks has changed your class? How have you all changed?
- Does it make you feel more like part of the class? What was different before you started using the online learning community.

Week 5

- Today we're going to talk about how you have been learning online for the last six weeks.
- How do you think that online learning has benefitted you or helped you this year?
- How do you think your class has changed with your work online?
- We've spent a lot of time lately talking about having a tribe. How do you think the online work has affected the way people work, or interact, or communicate with each other?
- Overall, what do you think is the best thing about online learning?

APPENDIX C

PARENTAL CONSENT FORM

I agree/give my consent for my child, _____, to participate in the research project entitled The Design of a Collaborative Online Learning Environment in an Elementary Classroom that is being conducted by Timothy N. Clark, Instructional Technology Specialist, Forsyth County Schools, 1120 Dahlonega Highway, Cumming, GA, 30040, 770-887-2461 x 202221. I understand that this participation is voluntary; I can withdraw my consent, and I or my child can withdraw consent at any time without penalty.

The following points have been explained to me and my child:

1. The reason for the research is to investigate the design of learning module within ANGEL Learning System to promote the development of a virtual community of practice within a fourth grade classroom. The benefits that I may expect from it are that my child will be provided with opportunities to work with other children to solve meaningful, authentic problems. They should experience a sense of discovery as they participate in activities at school that are motivating and relevant. Through effective uses of technology, teachers can facilitate student collaboration and communication by helping students to construct new meanings and solve real world problems. ANGEL Learning System has the potential to provide an effective organizational structure that promotes the collaborative uses of technology while simultaneously providing students with safer online experiences.

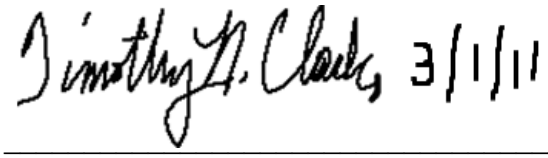
2. The procedures are as follows:

    - Surveys: The classroom teacher and the students will complete a minimum of three surveys that will investigate current perceptions about the effectiveness of the learning module to engage students in collaborative practices and improve instruction.
    - Journal Entries: Students will complete three journal entries in which they reflect on their work within ANGEL Learning System.
    - Observations: Teachers and students will be observed while using the learning module within ANGEL Learning System.
    - Student and Teacher Artifacts: These artifacts may include teacher generated lessons and activities that have been provided within the online course and student made products and projects.
    - Focus Groups / Interviews: Throughout all of the above procedures, teachers and students may be invited to participate in discussions (focus groups or interviews) about their perceptions, the observations, or their artifacts. These interviews are designed to clarify and provide additional anecdotal information for inclusion into this study. Discussions will be led by the researcher.

3. There are no discomforts or stresses that may be faced during this research.
4. No potential physical, psychological, social, or legal risks are involved through participation in this research.
5. The results of this participation will be confidential and will not be released in any individually identifiable form without the prior consent of the participant unless required by law. All student work will be password-protected within Angel Learning System, and all data including transcripts of interviews, artifacts of identifiable student work, and online communication will be destroyed or erased at the conclusion of the dissertation involved in this study.

   This study includes online surveys within Angel Learning System, and the software has been programmed not to collect Internet protocol addresses that may reveal your computer's identity to the researcher.

6. Inclusion criteria for participation: Approximately 27 fourth grade students between approximate ages of 9-11 years old and their teacher will participate in this study.



Signature of Investigator, Date

Signature of Participant or authorized representative, Date

PLEASE SIGN BOTH COPIES, KEEP ONE AND RETURN THE OTHER TO THE INVESTIGATOR

Research at Kennesaw State University that involves human participants is carried out under the oversight of an Institutional Review Board. Questions or problems regarding these activities should be addressed to the Institutional Review Board, Kennesaw State University, 1000 Chastain Road, #0112, Kennesaw, GA 30144-5591, (678) 797-2268.

APPENDIX D

STUDENT ASSENT FORM

Study Title: The Design of a Collaborative Online Learning Environment in an Elementary Classroom

Researcher: Timothy N. Clark

Instructional Technology Specialist

Forsyth County Schools

1120 Dahlonega Highway

Cumming, GA 30040

770-887-2461 x 202221

My name is Timothy N. Clark. I am from Kennesaw State University.

I am inviting you to be in a research study about how students learn together online.

- Your parent knows we are going to ask you to be in this research study, but you get to make the final choice. It is up to you. If you decide to be in the study, we will ask you to do the following:
    - complete surveys about what you think about learning online
    - keep a journal about your online assignments
    - be observed when you are working online
    - complete projects online, and those projects will be checked
    - be interviewed about what you think about learning online
- This entire study will take about six weeks to complete.
- If you participate in this study, you may learn more about how to learn online, and you may learn more about working with other students online. Your teacher may also learn how to plan more learning activities for students to complete online.
- There should be no risks to you for participating in this study, and every attempt will be made to make the learning activities interesting and enjoyable. If you get tired of answering questions, you may always ask for a break.
- If anything in the study worries you or makes you uncomfortable, let us know and you can stop. There are no right or wrong answers to any of our questions. You don't have to answer any question you don't want to answer or do anything you don't want to do.
- Everything you say and do will be private. We won't tell your parents or anyone else what you say or do while you are taking part in the study. When we tell other people about what we learned in the study, we won't tell them your name or the name of anyone else who took part in the research study.
- You don't have to be in this study. It is up to you. You can say no now or you can change your mind later. No one will be upset if you change your mind.

- You can ask us questions at anytime and you can talk to your parent any time you want. We will give you a copy of this form that you can keep. Here is the name and phone number of someone you can talk to if you have questions about the study:

  Name: Timothy N. Clark Phone number: 770-887-2461 x 202221

- Do you have any questions now that I can answer for you?

IF YOU WANT TO BE IN THE STUDY, SIGN OR PRINT YOUR NAME ON THE LINE BELOW:

Put an X on this line if it is okay for us to record you _____

_____ _____

Child's name and signature Date

Check which of the following applies

☐ Child is capable of reading and understanding the assent form and has signed above as documentation of assent to take part in this study.

☐ Child is not capable of reading the assent form, but the information was verbally explained to him/her. The child signed above as documentation of assent to take part in this study.

_____

Name of parent who gave consent for child to participate

_____ _____

Signature of person obtaining assent Date

APPENDIX E

TEACHER CONSENT FORM

I agree/give my consent to participate in the research project entitled The Design of a Collaborative Online Learning Environment in an Elementary Classroom that is being conducted by Timothy N. Clark, Instructional Technology Specialist, Forsyth County Schools, 1120 Dahlonega Highway, Cumming, GA, 30040, 770-887-2461 x 202221. I understand that this participation is voluntary; I can withdraw my consent at any time without penalty.

The following points have been explained to me:

7. The reason for the research is to investigate the design of learning module within ANGEL Learning System to promote the development of a virtual community of practice within a fourth grade classroom. The benefits that I may expect from it are that I will be provided with opportunities to teach my students how to solve meaningful, authentic problems. They should experience a sense of discovery as they participate in activities at school that are motivating and relevant. Through effective uses of technology, teachers can facilitate student collaboration and communication by helping students to construct new meanings and solve real world problems. ANGEL Learning System has the potential to provide an effective organizational structure that promotes the collaborative uses of technology while simultaneously providing students with safer online experiences.

8. The procedures are as follows:

    - Surveys: The classroom teacher and the students will complete a minimum of three surveys that will investigate current perceptions about the effectiveness of the learning module to engage students in collaborative practices and improve instruction.
    - Journal Entries: Students will complete three journal entries in which they reflect on their work within ANGEL Learning System.
    - Observations: Teachers and students will be observed while using the learning module within ANGEL Learning System.
    - Student and Teacher Artifacts: These artifacts may include teacher generated lessons and activities that have been provided within the online course and student made products and projects.
    - Focus Groups / Interviews: Throughout all of the above procedures, teachers and students may be invited to participate in discussions (focus groups or interviews) about their perceptions, the observations, or their artifacts. These interviews are designed to clarify and provide additional anecdotal information for inclusion into this study. Discussions will be led by the researcher.

9. There are no discomforts or stresses that may be faced during this research.
10. No potential physical, psychological, social, or legal risks are involved through participation in this research.

11. The results of this participation will be confidential and will not be released in any individually identifiable form without the prior consent of the participant unless required by law. All student work will be password-protected within Angel Learning System, and all data including transcripts of interviews, artifacts of identifiable student work, and online communication will be destroyed or erased at the conclusion of the dissertation involved in this study.

    This study includes online surveys within Angel Learning System, and the software has been programmed not to collect Internet protocol addresses that may reveal your computer's identity to the researcher.

12. Inclusion criteria for participation: Approximately 27 fourth grade students between approximate ages of 9-11 years old and their teacher will participate in this study.

Timothy N. Clark 3/1/11

_____

Signature of Investigator, Date

_____

Signature of Participant or authorized representative, Date

PLEASE SIGN BOTH COPIES, KEEP ONE AND RETURN THE OTHER TO THE INVESTIGATOR

Research at Kennesaw State University that involves human participants is carried out under the oversight of an Institutional Review Board. Questions or problems regarding these activities should be addressed to the Institutional Review Board, Kennesaw State University, 1000 Chastain Road, #0112, Kennesaw, GA 30144-5591, (678) 797-2268.

APPENDIX F

GEORGIA PERFORMANCE STANDARDS

Grade 4: Social Studies

Historical Understandings

SS4H1 The student will describe how early Native American cultures developed in North America.

a. Locate where Native Americans settled with emphasis on the Arctic (Inuit), Northwest (Kwakiutl), Plateau (Nez Perce), Southwest (Hopi), Plains (Pawnee), and Southeast (Seminole).

b. Describe how Native Americans used their environment to obtain food, clothing, and shelter.

SS4H2 The student will describe European exploration in North America.

a. Describe the reasons for, obstacles to, and accomplishments of the Spanish, French, and English explorations of John Cabot, Vasco Núñez de Balboa, Juan Ponce de León, Christopher Columbus, Henry Hudson, and Jacques Cartier.

b. Describe examples of cooperation and conflict between Europeans and Native Americans.

(GeorgiaStandards.Org, 2008)

APPENDIX G

ROBBIE'S FIRST DISCUSSION POST

Ancient Animals and Discoveries

Sometimes when i look at a animal i think if they were here now what did they look like a very,very,very long time ago maybe 7 million years ago. when the Ice Age start did they have very long and warm fur? I was watching the discovery channel (Cause i was very bored) and they found a fossil of a palm tree in Alaska. I had to admit that was pretty cool and all but could they be faking it? Nah i dont think so. I believe it. Also they found a Pink Shark. It was named The Pink Goblin Shark. It said to be 2 more in existince. Plus it said that it can live for over a million years!!! Its teeth are very sharp cause when a man touched Its teeth, He was bleeding alot cause it was so gosh dang sharp. It said that the teeth are so sharp it can kill its prey in 6-10 seconds without trying. They tested that with a Medium-Sized Fish. And on one part they found a dinsosaur called something like the sizeosouras that is so big it needs 2 hearts and 2 brains for it to live. Its 5x the size of a adult longneck. Thats pretty big :P Once i was in my back yard and i found a 3 headed ant in amber Which was so cool. The thing was gross lookin. Another ancient animal is the Wooly Mamoth. Wooly mamoths are now Elephants. When theres a change of coldness in the world and its starting freeze up the Elephant has a baby and it turn into a wooly mamoth i think. Its DNA switches. A Dog back then i learned was shaped very diffrent and weird. Later in the future they are going to make a wooly mamoth by DNA. They are going to take something with a wooly mamoth witch it DNA into a egg and it will comeout as a Wooly Mamoth!!! Which i also thought was awesome :P So thats my story for that topic.

APPENDIX H

THREAD OF ELISE'S DISCUSSION POST

What did you do for Spring Break, Elise?

Elise: My Spring Break :) by Elise!!

My spring break felt VERY short! It was OFALLY FUN though! I was at home like allday everyday! (Of spring break.) Then on the Monday of no school that was the acutual spring break, we went swimming! I texted my bffal and asked if she wanted to come to come to the Super 8 Motel with us and she said, "Sure!!!! That would be fun!!!!" The next day I texted her and told her that we are coming to get her to go swimming and to be outside waiting for us. A few minutes after that, we got ready and left to go and get her! We got at the pool and we held hands and jumpped into the COLD water!!!!! When we got into the water we got straight out and we had cold bumbs on us!!! It was about time to go eat so we got in the hot tub. IT WAS HOT!!!! An hour later from playing in the water and taking showers and drying our hair! We had to go and eat! So, we went to the eating place in the Motel. I didn't think that it would be good! BUT IT WAS!!! We went back to the room and went to bed. The next day we went home and went t othe pool and park in our neighborhoood!! Yes, we are neighbors!! When we got done at the pool and park, we were tired so we went hto my house and hung out in my room!!! Then we both ate at my house and then she called her mom to see if she could spend the night with me and her mom said, "Sure!!!! But don't go to the pool again or you will get sunburned!!!!" We hung out and everything and went outside at 1:00 at MIDNIGHT and walked around the WHOLE neighborhood!!!!! Then we went home slept and then she went home!:(I texted her to see if she wanted to go to Church in the morning and she

said "YES!!!!" The next morning we went to Church and then came back, went to our seprate homes and went to bed because we had school the next day!!!

Denise: RE: My Spring Break :) by Elise!!

WOW YOU WROTE A LOT Elise!!!!!!!!!!!!!!!!!!!!

Elise: RE: RE: My Spring Break :) by Elise!!

Well thats what you are supposed to do like to add ALOT of details into it!!!

Ms. Johnson: RE: My Spring Break :) by Elise!!

Sounds like you had a great time with your friend...

Elise: RE: RE: My Spring Break :) by Elise!!

Yeah! I did! She is in Ms. Smith's class and her name is Stacey! She's my neighbor and we ride the same bus,and sit in the same seat!!!!!

Mindy: RE: My Spring Break :) by Elise!!

?!?!? THAT WAS LONG!!!!

Elise: RE: RE: My Spring Break :) by Elise!!

Well, thats what happens when you add ALOT of details and stuff like that, and that's what I did was to add ALOT of details, also that's why it was soooo long!!!!

Tim Clark: RE: My Spring Break :) by Elise!!

That sounds like it was a lot of fun, Elise! I really like how you added so many details that it was really easy for me to picture your time with your friend.

Ms. Johnson: RE: My Spring Break :) by Elise!!

Sounds like you had fun but I don't like the walking around the neighborhood at night when your parents do not know where you are. That is not good. You have to be careful.

APPENDIX I

THREAD OF SIMONE'S DISCUSSION POST

What interesting things are happening around the world and what affects are they having?

Simone: What i think we should talk about- By: Simone

> I think we should we should talk about what happened in Japan its really bad. If feel bad for the people in Japan. I think we should help them instead of sitting around. Don't you think we should help the people in japan? It would be nice to help them too. It's bad what's happening to the Nucliar powerplant. First there was a bad earthquake. Then, there was a bad tsunami. Which is really bad so many things are destroyed!!!
>
> From: Simone

Tim Clark: RE: What i think we should talk about- By: Simone

> You're right, Simone! It is really horrible about how so many bad things have happened all at the same time in Japan. I just can't imagine it!

Candi: What i think we should talk about- By: Simone

> I think it is great you are trying to help japan in their time of need. How can we all help?

Simone: How we can help

> Dear Candi,
>
> The way we can help Japan is by donating money to the American Red Cross. So they can send that money to Japan. I wish some people wouldn't so selffish and not BOTHER to help! It's a Big Tradegy. It's just horrible that people are being selffish and cruel! Don't you think it's horrible they wont help? Did you know that Japan had there earthquake was really strong. It was 9.0 almost the strongest earthquake. The strongest is 10 that's the strongest there can be. But Jackson said it was 9.4 but i'm not sure.

Sincerely,

Simone

Jackson: RE: What i think we should talk about- By: Savannah

Simone, I really agree with you, but do you know that in Libia their leader is killing the civillians and the french, british, and american armies are tring to fight his forces.

Tim Clark: RE: RE: What i think we should talk about- By: Simone

The trouble in Libya is also a terrible thing, and I can't even understand why a leader would try to kill his own people.

Simone: Disasters

Dear Jackson,

That's sounds really bad. They both aren't good things. I agree that what's happening in Libia is bad. They both need help! But you spelled my name wrong! It's spelled like this Simone you forgot the e at the end. But both disasters are sound Terrible. It's like Call of Duty for Libia just in real life! Which i agree is really bad. I'm not saying i don't agree or anything.

Sincerely,

Simone

APPENDIX J

MALLORY'S PAWNEE STORY BLOG

Use this blog to write your collaborative story about a day in the life of your tribe.

Hi, my name is Uka. I'm only 10 yrs.old. Today I'm going to tell you about me and my tribe. Let's start out with the children and me.

We have alot to do and the parents have like one job they each have to do. The children have to do the rest, but the moms also help us if its really hard to do. The girls have to pick the berries, weave baskets,and serve the food. The older boys have to hunt tiny animals. The younger men hunt with the other men. And the women cook and take care of the little kids and babies.

Now I'll talk about our clothing. The men wear animal skin leggings, loin cloth, and a belt. They barely wear shirts, instead they wear buffalo furs that cover their shoulders.(A distinguish man often wear a grizzly bear claw necklace to despite their bravery.) The girls and women wear dresses made of deer skins. We also wear jewlery, like earrings and braclets, made of seashells, metal, or beads.